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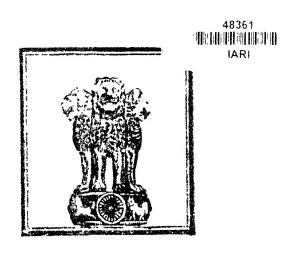
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### A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA

(ISSUED BY THE COMPOST DEVELOPMENT OFFICER) MINISTRY OF AGRICULTURE, GOVERNMENT OF INDIA)



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- 1. Introductory.—The present Bulletin is issued on the lines of the Compost Circulars which were issued by the Chief Biochemist during 1944-45, when the Compost Schemes were under the Indian Council of Agricultural Research. It would contain brief reports of compost development different parts of India and discussions on technical aspects concerned with Compost production and distribution. Provincial Compost Development Officers and Biochemists, are requested to send every quarter short and condensed reports of progress made on their schemes and new developments, if any, and also any peculiar technical or other difficulties met with in the way of developing compost production in their respective areas. It is expected that the present Bulletin would serve as a medium for exchange of data and information and keep Compost Officers posted with the latest developments taking place in the Compost line in other parts of India.
- 2. First All India Compost Conference.—The First India Conference on Compost that was held at New Delhi on the 16th and 17th of December, 1947, forms the second landmark in the history of Compost Development in India, the first one being the inauguration of the all India Compost Scheme by the Indian Council of Agricultural Research in August, 1943. A copy of the Proceedings of the above Conference is given in Appendix A. It is regretted that on account of the urgency with which the Conference had to be arranged, invitations could not be sent to all Provinces and States to depute their Compost Officers to attend the Conference. It is expected that the next all India gathering of Compost Officers which would be in the form of a Central Compost Development Committee would be representative.
- 3. Provincial Compost Development Conferences.—The all India Conference on Compost held at New Delhi obtained wide publicity, thanks to the interest evinced in the matter by Mahatma Gandhi; but more intensive propaganda and publicity in the Provinces and States is necessary if the

Compost programme is to be pushed through to a successful issue within a short time. It is, therefore, suggested Provincial and State Biochemists should take steps to arrange for Provincial Compost Development Conferences lines of the Conference held at Delhi. The Central Provinces and Berar are arranging to hold a Provincial Conference towards the end of June or early in July 1948, under the active support and inspiration of the Hon. Mr. R. K. Patil. Minister for Food and Agriculture. Central Provinces. The Conference may probably be spread over 2 or 3 days, at which the whole problem of Compost Development in the urban and rural areas of Central Provinces would bo dealt with in detail in all its practical aspects and the various steps needed to fulfil the programme would be fully determin-In addition to representatives of the different departments of the C. P. Government who are concerned in Compost Programme, e.g., Agriculture, Forestry, Revenue. Health. Local Self Government, Cooperation, Transport, etc., representatives of organizations interested in the such as municipalities, Village Panchayats, Kisan Sabhas, Agricultural Organizations and health associations would also be invited. Delegates would be taken to visit Compost and tree-planting demonstrations held in adjoining rural and urban areas. It is expected that the holding of Provincial Conference would not only ensure wide publicity to the Compost Programme, but also secure the active operation of the urban and rural public without which it is impossible to execute the Compost Programme to a successful issue.

4. Compost Work in the United Provinces.—Compost production in the United Provinces is making rapid headway, thanks to the great interest shown in the matter by the Hon. Mr. K. D. Malaviya, Minister for Development and the Hon. Mr. N. A. Sherwani, Minister for Agriculture. Pandit Malaviya recently organized an intensive drive for increasing Compost production in the U.P. and backed it up by powerful propaganda. The pamphlet entitled "Ghure Me Sona" is an excellent publication, worth perusal by all intersted in the Compost Programme. Copies of the above can be obtained from Mr. J. P. Misra, Publicity Officer, Cooperative Department, Lucknow, United Provinces.

The U.P. Government have recently taken up a number of steps to expand their Compost activities. They have

sanctioned an expanded Village Compost Scheme, which would cover 10,000 villages per year. The Scheme will operate through the regular kamdars and Mistris maintained by the Agricultural Department in the Tehsil areas, but the technical side of the scheme will be supervised by the Provincial Biochemist, U.P., who is provided with an operative staff for the purpose of training the agricultural field staff and also for maintaining technical supervision over the quality of manure produced, soundness of the methods adopted and efficiency with which the scheme is operated.

Under the Urban Compost Scheme, Government pressure is being brought to bear on all municipalities, notified areas and town committees to adopt the compost system for disposal of their refuse. The U.P. Government have further directed that a special allowance ranging from Rs. 10|- to Rs. 20|- per mensem should be given to Sanitary Inspectors who are incharge of Compost Depots in addition to their normal work in the town areas; the amount of such special allowance to be given to a Sanitary Inspector and its continuance would depend on a half yearly certificate to be given by the Provincial Biochemist. This rule would ensure that Sanitary Inspectors would take more interest in Compost production and keep their Depots quite clean. It is hoped that other Provincial Governments operating Urban Compost Schemes would also issue similar orders in the matter.

The Provincial Congress Committee, U.P., has issued a directive to all Congress Committees in U.P. that they should offer their active cooperation in working the Compost Scheme in their respective areas. With such powerful backing, the urban and village compost schemes in the United Provinces are bound to become great successes.

5. Compost work in the Central Provinces and Berar.—On the initiative of the Hon. Minister for Food and Agriculture, C.P. (Hon. Mr. R. K. Patil) a Conference of Departmental heads interested in the Compost programme was held at Nagpur on the 8th February, 1948. In addition to the Hon. Minister for Food and Agriculture, the meeting was attended by the Hon. Minister for Law and Public Health (Hon. Dr. W. S. Barlingey), the Parliamentary Secretaries to the Ministers for Public Health and Food and Agriculture, the Secretary and Under Secretary to the Department of Agriculture, C.P. and Berar, Director of Agriculture, Concervator of Forests, Public Health Engineer, Registrar of

Cooperative Societies, the Deputy Commissioner, Nagour, the Provincial Motor Transport Controller and other Municipal, Public Health and Agricultural Officers. The Chief Biochemist to the Government of India was also present at the meeting.

The meeting considered in outline the recommendations made by the all India Conference held at Delhi on December 16th and 17th with special reference to expansion of work under the urban and village compost schemes.

After general discussion in which the representatives of various departments took part, it was decided that:—

- (i) Section 50 of the Municipal Manual relating to the disposal of night-soil and rubbish by municipalities should be amplified so as to specify the Compost System as the recommended method of disposal.
- (ii) In order to persuade the remaining 51 municipalties to adopt the composting system, the departments Revenue, Local Self Government, Cooperation, Labour, Transport and Agriculture should offer such necessary help may be required by the municipalities, by way of expeditious acquisition or vesting of land required for compost preparation, grant of loans for purchase of trucks or carts for the collection of refuse, procurement of iron and steel for the maintenance and construction of refuse carts, procurement of sufficient sweeper labour for composting, market for the compost prepared by way of propaganda and through the formation of multipurpose Cooperative Societies, which should undertake the distribution of the compost to the farmers and cultivators in the area surrounding towns, etc. Till such time as a local market is created, the Agricultural Department should undertake the distribution of the manure by trucks maintained by them and for this purpose the number of trucks maintained in C.P. and Berar should be increased to 8 during 1948-1949.
- (iii) A Village Compost Scheme should be started covering about 3,000 villages per year in C.P. and Berar with a skeleton technical staff for the purpose of training the existing Jamadars and District Staff of the Agricultural Department in the improved methods of manure preparation, sectional filling of trenches, simple methods of urino conservation, tree-planting in villages and composting of

special types of sefuse like forest leaves, jowar stubble, sugar-cane trash, etc. A draft Scheme which was prepared for this purpose was approved of.

- (iv) In order to coordinate the activities of the different departments of Government who are interested in the Compost programme and to obtain the desired cooperation and response from the rural and urban organizations representing the public like Village Panchayats, Kisan Sabhas, Municipalities, etc., which is necessary to ensure the success of the compost programme, it was decided to convene a Provincial Compost Development Conference at Nagpur in June or July, 1948.
- (v) The question of village sanitation and suitable methods which should be recommended for adoption for the above purpose were also considered at the meeting, specially in the light of the recent report of the Rural Sanitation Committee of C.P. and Berar. The members examined in this connection the operation of the Sanitary Pit Privy in the bungalow, of the Hon. Minister for Rural Development (Hon. Dr. W. S. Barlingey). The Chief Biochemist explained that the matter of recommending a suitable method for village sanitation was under consideration of the sub-committee appointed for this purpose by the All India Conference on Compost held at New Delhi in December, last and promised to expedite the necessary recommendations in this matter.
- 6. Our National Leaders and the Compost Programme.— Compost Development Officers and Biochemists Provinces and States who find the tempo of Compost work in their areas not coming up to the level of U.P. and C.P. should avail of the new enthusiasm created by the All India Compost Conference and the formation of the Central Compost Development Committee to give a new push forward to their Compost Schemes. The highest leaders in the starting from Mahatma Gandhi downwards, and the powerful politicians of the country including the Minister Pandit Jawahar Lal Nehru and almost all Governors and Premiers of Provinces have spoken highly of Compost work and the need for developing this work as rapidly possible. Compost has now become a national undertaking of great importance, the first milestone in the path of rural and agricultural improvement of our country. Some of the opinions expressed by our national leaders regarding Compost are summarized in Appendix B.

7. Central Compost Development Committee.—In view of the great importance of increasing compost production in this country, the Government of India have appointed a Central Compost Development Committee consisting of the following gentlemen:—(1) The Hon. Shri Jairamdas Daulatram, Minister for Food and Agriculture (Chairman); (2) Sir Datar Singh, Additional Secretary, Ministry of Agriculture, Government of India (Vice Chairman); (3) Shrimati Mira Behn, Hony, Agricultural Adviser to U.P. Government, Rishikesh; (4) Dr. J. C. Kumarappa, All India Village Industries Association, Wardha; (5) Shri Shiv Kumar Sharma, Editor, Krishi Sansar, Bijnor (U.P.) (6) Dr. C. N. Acharya, Chief Biochemist to Government of India (Secretary); (7) Dr. B. N. Lal, Provincial Biochemist, Compost Scheme Department of Agriculture, United Provinces Lucknow: (8) Dr. K. G. Joshi, Provincial Biochemist, Compost Scheme Department of Agriculture, Central Provinces and Berar, Nagpur; (9) Dr. M. R. Madhok, Provincial Biochemist, Compost Scheme, Department of Agriculture, East Punjab. Simla; (10) Dr. S. V. Govinda Rajan, Agricultural Chemist, State. Department of Agriculture, Mysore Bangalore: (11) Mr. M. N. Basak, Provincial Biochemist, Compost Scheme Department of Agriculture, West Bengal, Calcutta; (12) Mr. R. B. Gode, Provincial Biochemist, Compost Scheme, Department of Agriculture, Bombay Province, (13) Mr. K. Gupta, Provincial Biochemist, Compost Scheme, Department of Agriculture, Bihar, Patna; (14) Mr. Madhob Patnaik, Provincial Biochemist, Compost Scheme, Department of Agriculture, Orissa Province, Cuttack; (15) Mr. M. S. Siva Raman, I.C.S., Director of Agriculture, Madras Province, Madras; (16) Mr. M. S. Randhawa, I.C.S., Deputy Commissioner, Delhi; (17) Mr. T. C. Kochunni Pillai, sistant Director of Agriculture. Travancore vandrum; (18) Dr. V. Subrahmanyan, Professor chemistry, Indian Institute of Science. Bangalore: (19) Representative of the Ministry of Finance. Government India; (20) Mr. Hamilton, Inspector General of Government of India, (21) Representative of Ministry Education, Government of India; (22) Representative Ministry of Health, Government of India; (23) Representative of Ministry of Transport, Government of India.

The functions of the Committee would be to advise the Government of India on the detailed steps to be taken in order to hasten the speed of Compost Development in India and for this purpose the Committee would review periodically the progress of compost production and allied schemes in India and work out detailed plans for increasing the rate of compost production in the country, so as to cover the whole of the refuse materials available in the rural and urban areas. The Committee would also carry out intensive propaganda in favour of compost development and for this purpose organize Provincial Compost Development Conferences and Committees in different parts of the country. The Committee would normally meet once in six months to review the work done and frame a programme for the next six months.

8. Meeting of the Village Sanitation Committee of the Compost Conference.—The Conference on Compost held in New Delhi in December last appointed a sub-committee consisting of Shrimati Mira Behn, Shri Shiv Kumar Sharma, Dr. K. G. Joshi and Dr. B. N. Lal (with Dr. B. N. Lal, as Convenor) to compare existing methods for the disposal of night-soil and urine in villages and to select a simple method which could be recommended to provinces for adoption villages. The above sub-committee held its first meeting at Rishikesh on the 16th and 17th of February, 1948. Dr. C. N. Acharya, Chief Biochemist, was also present by special invi-The sub-committee felt that in view of the large number of villages which would have to be tackled under the Scheme, the method recommended should be simple cheap, and in addition to ensuring proper sanitation (with reference to smell, fly-breeding and destruction of pathogenic organisms), the method should simultaneously conserve the manurial value of the excreta by converting the same into a compost product which could be applied to land as manure. After comparing different systems, they were in favour of a wide trial being given to the Wardha System of Trench Latrines for villages.

A copy of the detailed recommendations made by the Sub-committee is appended hereto (Appendix C) for information of officers operating Compost Schemes.

9. Compost Statistics.—The latest statistics available regarding the production and distribution of Compost manure under the urban and village Compost Schemes in different areas are presented in Appendix D.

#### APPENDIX A.

PROCEEDINGS OF THE FIRST ALL INDIA CONFERENCE ON COMPOST, HELD IN NEW DELHI, ON THE 16TH & 17TH DECEMBER 1947.

On the initiative of Shrimati Mira Behn, a Conference of Provincial Workers and others interested in the Compost Programme was held in the Secretariat Buildings, New Delhi, on the 16th and 17th of December 1947.

The following delegates attended the Conference:—

- (1) The Hon. Dr. Rajendra Prasad, Minister for Food and Agriculture, Government of India (in the Chair).
- (2) The Hon. Raj Kumari Amrit Kaur, Minister for Health, Government of India.
- (3) The Hon. Pandit K. D. Malaviya, Minister for Development, United Provinces.
- (4) Mr. S. Basu, I.C.S., Secretary, Ministry of Agriculture, Government of India.
- (5) Sardar Datar Singh, Vice-Chairman, Indian Council of Agricultural Research.
  - (6) Shrimati Mira Behn, Rishikesh (U.P.).
- (7) Dr. B. M. Piplani, Deputy Secretary, Ministry of Agriculture, Government of India.
- (8) Mr. K. D. Bhatia, I.C.S., Development Commissioner, United Provinces.
  - (9) Mr. Shiv Kumar Sharma, Bijnor (U.P.).
  - (10) Shri Dharam Pal, New Delhi.
- (11) Dr. C. N. Acharya, Chief Biochemist to Government of India.
- (12) Dr. B. C. Das Gupta, Health Ministry, Government of India.
  - (13) Mr. Puri, Transport Ministry, Government of India.
  - (14) Dr. B. N. Lal, Provincial Biochemist, United Provinces.
- (15) Dr. K. G. Joshi, Provincial Biochemist, Central Provinces and Berar.
  - (16) Shri G. L. Patil, Compost Officer, Bombay Government. The Conference was opened by the Hon. Dr. Rajendra Prasad.

Sardar Datar Bingh, Vice Chairman, Indian Council of Agricultural Research, in welcoming the delegates and requesting Dr. Rajendra Prasad, Minister for Food and Agriculture to open the Conference mentioned that as a result of researches carried out under the auspices of the Indian Council of Agricultural Research Bangalore, a suitable Process was worked out for the Composting of Town Refuse in India; and this scheme which is now supervised by the Government of India, is operating at 600 Municipal Centres in India producing about 5,00,000 tons of compost per year but the scope for expanding the work is immense, since there are nearly 4.000 towns in India which can produce about 100 lakh tons of manure. In the villages, a good portion of dung is wasted as fuel, while we are losing nearly Rs. 100 crores in importing food-stuffs from abroad. A portion of the above sum if it had been spent in increasing the quantity of manure prepared in villages would have not only met our food requirements but would have also improved the fertility level of our soils.

There are huge quantities of cow-dung going to waste in our cities, gowshalas and grazing areas. The sewage and sludge available in our towns is not being utilised for increasing our agricultural production. It sounds bad economics to leave our resources undeveloped while, we continue to import increasing quantities of chemical fertilizers and of food-stuffs year by year. The progress achieved so far by our urban and village Compost Schemes represents barely 1 to 2 per cent. of our potential resources and all our attention should be concentrated in the first instance on developing the above resources as rapidly as possible.

### Dr. Rajendra Prasad.

The Hon. Dr. Rajendra Prasad said:—It is a matter of great pleasure to me to preside over this Conference. We have had various experiments in the past with different kinds of manure which will help to Grow More Food. Whatever may be the individual merits of the different kinds of manure, there is one thing that is sure about farm-yard manure, viz., that it not only helps to improve yields, but also keeps up the fertility of the soil through the humus added. As such, there is no question that farm-yard manure is one of the best forms of manure to be used. There is also this much to be said in its favour that it can easily be made. We do not require big factories or large land for this purpose. It gives wealth with little effort. If only we knew how to utilise all that is wasted today, like waste of time, waste of energy, waste of material, waste of food, and

last but not least the waste of what we call waste, a great amount of our problem will be solved.

Sardar Datar Singh has given you figures with regard to the amount of Compost being prepared at present, but up-till-now we have touched only the fringe of the problem. We have been using farm vard manure from time immemorial but we have not yet realised the importance of every bit of cow-dung wasted. I am told that not more than one third of the dung is being utilised as manure, the remaining two-thirds, being either burnt as fuel or otherwise wasted. If the remaining two-thirds could also be utilised, we could meet our manurial requirements without any difficulty. The question is how we can do it. Cow-dung is now being used for fuel not because our people do not know its use as manure but because they have no other alternative. If we can give them some alternative fuel, I think, a great amount of cow dung can be kept for manurial purposes. Attempts have been made in certain places to have quick growing trees which would give us fuel, but it requires land for growing the trees and we have to wait for several years before the trees become fit to be used as fuel. My own idea is that as an alternative, we should devote some of the cultivated land for growing crops whose stems can be used for fuel, e.g., castor, maize, cotton and even sugarcane. Our Agricultural departments should carry out research to find out such crops as would give us fuel as well as fodder and food. Arhar (tur) is an example of such a crop.

There are other things which require our attention. Cattle urine is wasted almost wholly at present. Simple methods of absorbing the same in ash or earth should be introduced in villages. Attempts should be made to conserve human excreta in villages by opening trench-latrines. Village cooperative societies may very well undertake this work. Village bhangis can make a living out of the sale of the manure produced. In cities, the problem is some-what different. All the refuse should be converted into compost. The problem of the utilisation of cow dung accumulating in the cities is essentially a problem of transport.

The work detailed above has got to be carried out mainly by the Provincial Governments. Taluka committees and village committees should be made to supervise the work proceeding in their respective areas. Pandit K. D. Malaviya recently inaugurated a Compost Week in the United Provinces under which each village was asked to dig at least one trench and fill it up with compost. Similar propaganda drives would have to be organised in every province. This is a



Members of the Conference discussing Compost with Mahatma Gandhi.

type of work falling in line with the people and easily accepted by them, once the Government is able to convince the people of the advantages of compost making. The Government of India is prepared to back up the proposals that may be put up by the provinces for the above object.

#### Second Day's Proceedings.

The Conference resumed its session at 9 A.M. on the 17th December 1947, with Sardar Datar Singh, Vice-Chairman, Indian Council of Agricultural Research, in the Chair.

The Conference formed a Central Compost Development Committee consisting of non-officials and officials with Dr. C. N. Acharya, Chief Biochemist, Ministry of Agriculture as Secretary, which could act as an advisory body to the Central and Provincial Governments in the matter of Compost Development. A number of resolutions were passed urging on the Central and Provincial Governments to accelerate the present rate of production of Compost from urban and village refuse material. It was estimated that a complete utilisation of our indigenous resources would yield nearly 300 million tons of additional manure which would give us about 12-15 million tons of extra food-grains and also proportionate quantities of fodder for cattle. This would help to meet the present estimated deficit of 4-5 million tons of food stuffs in the country.

During the course of the discussion, the Hon. Pandit Malaviya mentioned that a compost drive has been started in the United Provinces which is expected to yield an extra 48 million tons of Compost. Dr. Acharya pointed out that the chief limiting factor for increasing compost production at present (especially of urban compost) was transport and motor trucks were in short supply for the purpose. Mr. Puri of the Transport Ministry promised to give necessary help of his Ministry in securing the supply of motor trucks needed for the above purpose.

The members of the Conference later met Mahatma Gandhi in the afternoon. Mahatma Gandhi gave his blessings for the success of the work undertaken by the Conference and while doing so humorously remarked that a good work needed no blessings from him, but if the work was bad, he should not bless it and his blessings would turn into curses.

The following is the text of the resolutions passed by the Conference:—

- I. This Conference is of the definite opinion that the Compost programme offers vast potentialities for increasing food production in the country; thus a systematic utilisation of urban wastes would yield about 10 million tons extra manure; similarly a more efficient utilization of our village wastes would add a further 100 million tons of manure, while a programme for providing alternative fuel in place of cow dung would release another 200 million tons of manure. an implementation of the above programme would thus result in the production of an extra 310 million tons of manure which would increase our food production by about 12-15 million tons per year as against our present estimated deficit of 4-5 million tons and at the same time provide additional fodder and help to improve the fertility level of our soils.
- II. This Conference has reviewed the work carried out so far under the existing schemes for Composting urban and village refuse and feels that while the work has shown steady development during the last three years, the results achieved so far which represent only 1-2 per cent. of the total potential capacity should be considered insignificant; and it urges on the Provincial Governments the need for accelerating the pace of the existing schemes, so that:—
  - (a) under the urban compost scheme, all municipalities notified areas and town committees are brought under the scheme within the next two years and developed to their full production capacity; and
  - (b) under the village compost scheme, at least 10 per cent. of the total number of villages in the Provinces are taken up during 1948-49 and an additional 10 per cent. are taken up in each succeeding year.
- III. In regard to the Town Compost Scheme, this Conference makes the following recommendations:—
  - (a) In view of the present food situation it should be made obligatory on all municipalities, notified areas and town committees that they should convert the whole of their refuse material into compost and for this purpose the facilities required by them by way of expeditious acquisition of land, procurement of transport, etc., should be provided by the Provincial Governments, and the municipalities or notified committees should be

- prohibited from selling uncomposted refuse or night soil to farmers.
- (b) The Health Ministry of the Government of India are requested to issue a directive to Provincial Governments (Local Self Government and Health Departments) recommending to them the adoption of the Compost System in preference to other methods of disposal of refuse and strongly urging prohibition of sale of uncomposted night-soil or kat-chra to farmers.
- (c) For the disposal of the compost prepared in town areas, the help of multi-purpose Cooperative Societies or Taluka Development Associations or similar existing bodies near town centres should be availed of, more actively than at present.
- IV. Regarding the Village Compost Scheme, the Conference recommends that:—
  - (a) The scheme should preferably be operated through Village Panchayats, Kisan Sabhas or Village Cooperative societies; and in order to help such village organisations with technical advice, demonstrations and training in compost-making and also for the purpose of sending periodical reports, a Compost Supervisor should be posted for each group of 10 villages.
  - (b) Where the villagers possess insufficient or no land for preparing compost, a common land should be acquired by Government for the purpose in the immediate vicinity of the village.
  - (c) In order to popularise the composting habit among the younger generation of villagers, a practical course in composting should be included in the syllabus in all primary and secondary schools situated in villages, and demonstration pits should be kept in routine operation in each school.
- V. The Conference considered in detail the problem of conservation of village night-soil and urine and recommended in this connection that simple dry methods should be adopted for this purpose; and appointed a sub-committee consisting of Shrimati Mira Behn. Shri Shiv Kumar Sharma, Dr. B. N. Lal and Dr. K. G. Joshi (with Dr. B. N. Lal as convenor) to prepare an Outline Scheme which could be recommended to Provinces.

- V1. This Conference desires to draw special attention to the huge stocks of cow dung that lie unutilised in grazing areas, goshalas and cities and urges that special schemes should be drawn up and operated by Provincial Gevernment's for utilising the above stocks.
- VII. In addition to the Schemes mentioned above, the Conference recommends that suitable Schemes should be drawn up and operated in each Province for:—
  - (a) the agricultural utilisation of town sewage, sullage and sludge,
  - (b) the utilisation of the by-products of the slaughter house and other trade wastes, e.g., wool wastes, mill wastes, leather wastes, etc., and
  - (c) for the composting of other materials like waterhyacinth, sugarcane trash, press mud, forest leaves, etc.; in cases, where village cooperative societies or individuals do not come forward to utilise the above materials, it would be advisable to prepare the compost under Government auspices till non-official agencies take it up.

VIII. This Conference is of the opinion that transport has been the chief limiting factor for rapid expansion of the compost scheme and urges on the Government of India and on Provincial Governments to give all necessary help to composting organisations in getting sufficient number of motor trucks for the purpose. It also strongly urges that the trucks at present in use by different Government Departments should also be utilised whenever possible for compost distribution. Transport by canal may also be considered wherever possible.

IX. This Conference urges that intensive propaganda should be carried out among farmers to point out the value of compost manure and for this purpose it urges on the Central and Provincial Governments to arrange for carrying out the above propaganda through the medium of ballads, dramas, radio talks, lantern slides, films, posters, pamphlets, exhibition stalls, demonstration plots, lecture tours, etc. Existing field publicity vans, newspapers, journals and other media should also be utilised for this purpose.

- X. In order to implement the above recommendations and expanded programme of work, the Conference recommends that:—
  - (a) an all India organisation known as the Central Compost Development Committee consisting of non-officials and officials and comprising the delegates attending this Conference as a necleous, with Dr. C. N. Acharya as Secretary, be formed, which would act as an advisory body to the Central and Provincial Governments and meet periodically in different Provinces for the purpose.
  - (b) Each Province should have a Compost Development Officer who would be in charge of the urban and rural compost work and allied manurial schemes in the Province, including the distribution of fertilisers and oil cakes; and the staff at the All India Headquarters should also be adequately strengthened in order to cope with the expanded programme.
  - (c) In view of the importance of the Compost Programme, sufficient funds should be allocated by the Central and Provincial Governments for implementing the above recommendations and for this purpose, the schemes already included under the five-year development plans have to be suitably amended.

#### APPENDIX B.

## OPINIONS OF NATIONAL LEADERS ON THE COMPOST, PROGRAMME.

1

#### 1. Mahatma Gandhi.

(i) Prayer Meeting on 19th December 1947.—The present food shortage is due to deficient production. One potent way of increasing production was proper manuring. Artificial manures, he was told were harmful to the soil. Mira Behn, who had become a Kisan and loved animals, especially the cow as well as human beings, had been instrumental in getting together a Compost Conference in Delhi. Dr. Rajendra Prasad, Sardar Datar Singh and others had participated in it.

The Conference had passed a number of resolutions enunciating ways and means of preparing Compost manure from cow-dung and human excreta and refuse. The compost manure emitted no bad odour. It would save lakks of rupees and also increase the fertility of the soil without exhausting it. The participants in the Conference wanted to increase production. It was a difficult task whose fruition depended upon the co-operation of the people.

(ii) Prayer Meeting on 20th December 1947.—Preparation of compost was itself a village industry. But this, like all village industries, could not give tangible results unless the crores of India co-operated in reviving them and thus making India prosperous.

This was the fundamental distinction between capital and labour. Capital exploited the labour of a few to multiply itself. The sum total of the labour of the crores, wisely utilised, automatically increased the wealth of crores. Therein lay true democracy, true Panchayat Raj.

(iii) Foreword to "Ghure men Sona".—Is not the value of compost shown by its producing paddy from dirt and thereby saving crores of rupees? Would the Kisans of India still overlook this material?

### 2. Hon. Pandit Jawaharlal Nehru, Prime Minister of India.

The vast majority of our population are agriculturists and our great volume of production is from agriculture. To increase our agricultural production, we must improve to a great extent the fertility level of our soils, as has been done in other countries. Thereby the economic condition of the country as a whole and of the

peasant class in particular would be greatly improved. In fulfilment of this object, the Hon. Keshadeo Malaviya has placed before us his programme of Compost Development, in which all can take part. I am in full agreement with the above programme and hopthat all peasants and Zamindars will lend their full support in making the programme a success and thereby improving their own lot. as well (Ghure men Sona).

### 3. Dr. Rajendra Prasad.

In our country, cow-dung is not being put to proper use. A good portion of it is either burnt as fuel or not collected at all. Even the manure prepared at present is not prepared on proper lines so as to give us the best results on land. Hence there is great need for active propaganda for preparing the best manure possible from all the dung and other refuse material available in the country. These refuse materials which create insanitation and spread disease in the country-side can be made to produce more food. Our wisdom lies in converting the above refuse into useful manure and utilising the same for producing more food. The programme launched by the U.P. Government to achieve this end is quite praiseworthy and deserves complete success. If the work proceeds properly, it is bound to show great increase in our crop production even within a year's time. (Ghure men song).

## 4. His Excellency Shri C. Rajagopalachari, Governor of West Bengal.

There is nothing more beautiful than this remarkable arrangement in nature by which all waste is automatically reabsorbed into life and growth. If only men could be induced to help nature in an orderly manner, the process of reabsorption could be made quicker, unaccompanied by any inconvenience and regulated so as to produce desired results. (Communication to Shri Mira Behn).

## 5. His Excellency Sir Chandu Lal Trivedi, Governor of East Punjab.

"I know that Compost manure is our most important need." (Communication to Shri Mira Behn).

### 6. The Hon. Govind Vallabh Pant, Premier, United Provinces.

In the refuse of our villages and the dung and urine of our animals lie hidden crores of rupees worth of our national wealth. Our kisans should start at once converting all the above refuse material into good quality compost by the methods recommended by the Government. On the one side it will prevent insanitary conditions in the villages and on the other produce manure werth crores

of rupees, resulting in considerable increased production of food grains. The time has come when our kisans should make organised efforts in what may appear small matters. It is the duty of kisans to convert waste matters into gold. An early execution of the Programme outlined in this booklet would serve to increase our crop yields greatly and add wealth to our kisans. (Ghure men gona).

## 7. Hon, Dr. B. C. Roy, Premier of West Bengal.

I am very interested in this because this (Compost) would be one of the solutions on which would depend the "Grow More Food Campaign" in every province (Communication to Shri Mira Behn).

## 8. Hon. Dr. Gopi Chand Bhargava, Premier of East Punjab.

There is no doubt that Compost has tremendous potentialities as a fertilizer. (Communication to Shri Mira Behn).

## 9. Hon. Pandit Keshav Deo Malaviya, Minister for Development. United Provinces.

Kisans, march forward! If you want to make your land fertile and to see the world around you full of vegetation, you must practise the methods outlined in this booklet. You must dig compost trenches in your respective villages and fill them with all available refuse, litter, cowdung and urine and prepare good Compost out of them. If you do not follow the advice of your national leaders in the matter, whose words else will you follow? The adoption of this-programme will brighten your fortune. (Ghure men Sona).

## 10. The Hon. Mr. N. A. Sherwani, Minister for Agriculture, United Provinces.

Manure is as necessary to land as food is for the human being. Neither man nor land can do work without food. The poverty of our kisans will vanish by producing compost on the lines recommended by the Agriculture Department. (Ghure men Sona).

## 11. Hon. Mr. N. Kanungo, Minister for Development, Orissa.

I have all along been an enthusiast of compost manure and during the last year, while I have been in charge of Agricultural Department, I have had experiments made in raising crops with compost as with other forms of manure to test the results. Observations up to now have shown that compost manure is equal to, if not better than, any other form of manure from the point of view of increased yield of crops. The beneficial residuary value on the soil is an added advantage. (Communication to Shri Mira Behn).

#### APPENDIX U.

PROCEEDINGS OF THE VILLAGE SANITATION SUB-COM-MITTEE OF THE ALL-INDIA COMPOST CONFERENCE.

(16th and 17th February 1948).

The members of the Sub-Committee examined the pit and trench methods of conservation of human excreta in demonstration at the Kisan-Ashram, Muldashpur and also considered the Report of the Rural Sanitation Committee, Central Provinces, the Wardha system of disposal of village human excreta in trenches and Shrimati Mira Behn's method for women in screened enclosures.

"The Sub-Committee is of the view that the method of disposal of night-soil in villages should aim at a simultaneous conservation of this as manure for increasing agricultural production and the methods should be simple enough to be capable of application to a large number of villages, at the same time, at moderate expenditure; and to this end recommends that:—

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- (1) in the case of small villages below population 1,000, Katcha trench latrines on the model of the Wardha System, should be recommended for men;
- (2) the screened enclosure method may be recommended for women and children at centres where bhangis are available;
  - (3) the Pit Privy method recommended by the Rural Sanitation Committee, C.P. and Berar, may be of use in the case of isolated bungalows in rural areas where bhangilabour is not available, but it is unsuitable for village units where the houses are crowded together;
  - (4) a suitable method for the conservation of human urine in towns and villages still remains to be evolved; in this connection further trial may be given to the methods suggested by Shrimati Mira Behn and Mr. Idnani (Indian Farming, Vol. VIII, No. 1, 1947, P. 31); and
  - (5) the above recommendations may be further reviewed at the next meeting of the Central Compost Development Committee to be held at Nagpur in July 1948 in the light of the data and information that would become available from the trials that are at present being

carried out in the Central Provinces and Berar, United Provinces and other areas, with special reference to the necessity or otherwise for having a *Bhangi* in each village for operating the Scheme.

#### SCHEDULE I.

### THE WARDHA SYSTEM OF DISPOSAL OF VILLAGE NIGHT-SOIL IN TRENCHES.

Trenches 25 ft. length  $\times$  2 ft. breadth  $\times$  3 ft. depth are used for receiving human excreta. A hedge 30 ft. length of grass or bamboo matting in the beginning, to be substituted by a live hedge in due course, is placed 3-4 feet in front of the trench as a screen parallel to the length of the trench. The trench is divided into six equal sections with the help of vertical partitions of bamboo or grass matting fixed inside a suitable thatch shed for privacy. six persons may simultaneously use the six sections of the trench. Heaps of refuse or earth are placed in front of each partition and a layer of it is spread at the bottom of each section to start with. Two wooden cross planks 4 ft. long and 10 in. broad are placed across each section at a distance of 12 in. from one another so as to form a seat on the trench starting from the left end of the section concerned. After use, the person covers the excreta with refuse or earth. After the material rises to a height within 6 in. of the top (which may take about a week if 20-25 persons use each section) the seat is moved on to the adjoining position inside the section. This operation is continued till the whole of the section is filled with excreta and refuse.

One trench of the above size of 25 ft.  $\times 2$  ft.  $\times 3$  ft. will be sufficient for 100 people for nearly three months. After one trench is filled up, the main screen is allowed to remain in the original position, but the shed and partitions are shifted to an adjoining parallel trench of the same size, dug about 4 ft. behind the first trench.

Three such trenches of the above size would normally suffice for 100 people throughout the year. While the third trench is being filled up, the contents of the first trench would have fully decomposed into inocuous manure and may be emptied out for sale to farmers for application to land. It would be advisable to have 3 to 4 separate units of 3 such trenches, screened in the manner indicated above and situated on different out-skirts of the village so as to be of easy access to the people. Separate units should be allotted for men and women.

In due course, steps should be taken to surround each batch of 3 trenches with a live hedge 4-5 ft. high. Bamboos and matting should be coated with creosote or tar to protect them against the weather and damage from white ants.

#### SCHEDULE II.

## SHRIMATI MIRA BEHN'S METHOD FOR WOMEN AND CHILDREN IN SCREENED ENCLOSURES.

A suitable area 15-20 ft. broad and 20-25 ft. long is enclosed all round with live hedge or grass or bamboo matting. Bricks or stones are provided to form seats arranged in rows without any partition in between. The users squat on the ground and the excreta are removed twice a day by a *Bhangi* who transfers the same to a close-by compost trench of suitable size in which the material is composted in alternate layers with dry refuse collected from the roads and surroundings of the village by the *Bhangi*. The compost is sold when ready to farmers.

#### SCHEDULE III.

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THE PIT PRIVY METHOD RECOMMENDED BY THE RURAL SANITATION COMMITTEE, C.P., & BERAR. LATRINE FOR FAMILY USE IN HOUSES WITH OPEN YARD AND WITHOUT PIPED WATER SUPPLY.

- (a) The most suitable type of family latrine for village houses with open yards is the sanitary pit privy.
- (b) The ideal type of sanitary pit privy should consist of a pit  $3\frac{1}{2}$  ft.  $\times$   $3\frac{1}{2}$  ft.  $\times$  5 ft. deep, with substantial shoving inside to prevent earth caving in; a reinforced cement concrete slab for covering the pit, with a squatting seat in it provided with a fly tight cover; and a vent pipe for escape of gases, covered on the top with 16 mesh copper gauze to prevent flies and mosquitoes entering the pit. Also a substantial super structure for privacy and protection from rain and weather.
- (c) A sanitary pit privy can be built in villages with local materials, provided the work is done under trained supervision and timber used for covering the pit is in proper size and durable quality (Babul, Jambul, Shami and Neem).

The covering must be made fly tight and sanitary by laying bricks in line over the wooden platform. 'A bored bamboo can be

used for the vent pipe, and a close mesh bamboo basket can be used on top of the hamboo for keeping flies and mosquitoes from entering the pit.

Such structure would, however, require good maintenance. If allowed to fall into disrepair this type of pit privy will create insanitary conditions.

The aim must therefore be, wherever possible, to use a reinforced cement concrete slab, and durable metal or coment asbestos vent pipe with wire gauze covering.

#### SCHEDULE IV.

### KISAN ASHRAM (RISHIKESH) METHOD.

Katcha or brick-lined pits 4 ft.  $\times$  4 ft.  $\times$  3½ ft. are prepared in mitably screened enclosures. Two wooden planks 6 ft. long and 10 in. wide are placed across the pit to form a seat. A heap of earth is placed in front of the pit and the user covers the excreta with a handful of earth. A pit can serve 10 persons for a period of about 4 months. Two such pits form a batch and when the second pit is nearing completion the contents of the first pit, which would have decomposed fully into manure by that time, are removed and used for application to land.

### APPENDIX D.

TABLE I.

STATISTICS OF COMPOST PRODUCTION AND DISTRIBUTION UNDER THE URBAN COMPOST SCHEME.

Provinces and States.	Quarter for which latest statistics received.	No. of Contres opera- ting.	Vol. of Compost prepared during the qr. (2/3 basis).	Vol. of Compost sold during the quarter.	Total Vol. of Compost sold during the financial year from 1st Apri 1.	Vol. of unsold Compost (old and new) in stock at the end of the quarter.
a	ь	c	d	6	1	,
			cu. ft.	cu. ft.	ou. ft.	ou. ft.
1. Ajmer-Merwara	31-12-47	4 (4)	18,114 (24,649)	11,375 (13,030)	74,950 (141,026)	3,63,594 (3,29,245)
2. Baroda	30-9-47	13 (13)	2,650 (14,200)	1,700 (—)	89,100 (—)	70,600 (1,61,000)
3. West Bengal	30-6-47	17 (17)	84,620 (64,820)	1,06,375 (1,03,565)	1,06,375 (1,03,565)	3,23,615 (4,17,510)
4. Bihar	30-6-47	18 (17)	1.47,468 (88,780)	1,88,801 (78,660)	1,88,801 (78,660)	7,42,488 (8,35,560)
5. Bombay	30-6-47	40 (35)	7,08,960 (3,54,640)	5,82,980 (3,32,610)	5,82,980 (3,32,610)	20,66,840 (12,10,650)
6. Central Provinces and Bersr.	31-12-47	59 (55)	4,75,600 (3,43,200)	2,07,250 (1,86,250)	3,96,100 (10,85,500)	21,13,800 (14,32,850)
7. Cochin	30-9-47	6 (5)	28,102 (25,548)	20,426 (13,408)	35,916 (13,408)	1,08,432 (77,640)
8. Delhi	30-6-47	4		1,09,410	1,09,410	••
9. Hyderabad	30-9-47	35 (35)	1,07,166 (1,76,252)	64,197 (60,362)	1,70 970 (4,28,872)	5,85,993 (4,77,890)
10. Gwalior	30-12-46	16 (22)	90,150 (1,46,495)	25,550 (10,800)	25,550 (10,800)	6,63,325 (5,73,635)
ll. Madras	30-9-47	87 (100)	13,91,923 (8,60,606)	9,21,557 (4,79,108)	23,13,030 (4,79,108)	48,03,904 (50,81,617)
12. Mysore	30-9-47	73 (45)	3,06,160 (3,31,620)	70,200 (19,950)	1.87,600 (19,950)	12,93,130 (9,52,970)
13. Orista	30-9-47	7 (5)	31,950 (35,700)	82,470 (00)	91,890 (60)	4,39,900 (41,170)
14. Punjab	31-3 47	46 (30)	6,09,740 (1,95,897)	5,98,090 (1,49,584)	5,98,090 (1,49,584)	11,00,470 (8,64,947)
l5. Travancore	30-9-47	14 (14)	2,50,355 (85,895)	2,29,974 (92,184)	4,18,453 (92,184)	2,54,830 (2,58,478)
16. United Provinces	30-9-47	108 (75)	19,20,430 (16,85,120)	21,42,700 (9,76,925)	31,48,110 (9,76,925)	47,22,050 (29,24,030)

<sup>(</sup>N.B.-Figures within brackets represent data for the corresponding quarter of the previous year).

### VILLAGE, COMPOST-SCHEME.

## TABLE-II.

Name of the Province.	Quarter for which latest statistics reported.	No. of villages operating the scheme.	Total Vol. of manure prepared during the qr.	vol. of manure put on land during the quarter.	Vol. of manure in stock at the end of the quarter.
a	ь .	ئىنى - ئاسى	· d	· · · · · · · · · · · · · · · · · · ·	<i>f</i> .
w			cu. ft.	cu. ft.	eu. ft.
l Assam	30-9-47	542	3,44,689	~~T,44,764	- 2,00,125
2. Bengal	31-3-47	2,919	23,81,818	32,45,158	23,01,848
3. Bombay—		•			
(a) Cooperative Compost Scheme.	30-9 47	281	12,01,448	2,29,212	9,72,286
(5) Rural Compost	30-9-47	· 957	2,05,710	Nıl	2,13,018
Madras	30-9-47	- ,2,279	6,60,734	5,66,785·	1,78,263
Punjab	30-6-47	299	12.68,535	10,11,201	7,29,514
United Provinces	30-9-47	1,808	26,99,714	18,78,519	13,79,159
Orissa	30-9-47	. 78	1,99,870	98,480	4,53,260

(A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

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# I. Meeting of the Central Compost Development Committee and C. P. Provincial Compost Development Conference.

The first meeting of the Central Manure (Compost) Development Committee which was recently constituted by the Government of India, will be held at Nagpur (C.F.) on the 5th, 6th and 7th July 1948. The Committee will critically examine the present position of the Urban and Village ('ompost Schemes operating in different Provinces, make note of the difficulties hampering progress and make detailed recommendations to the Central and Provincial Governments on the steps to be taken to overcome the existing difficulties and reach targets fixed for each area. It is expected that as a result of the Committee's deliberations, the compost programme would receive fresh impetus in all areas.

The occasion of the above meeting of the Central Committee at Nagpur, will be availed of to hold the C.P. and Berar Provincial Compost Development Conference. The Agenda has been prepared to include joint sessions of both meetings so that members of both organizations could confer together to their mutual advantage. The Joint Session will be addressed by the Hon. Shri Jairamdas Daulatram, Minister for Food and Agriculture of the Government of India and the Hon. Shri R. K. Patil, Minister for Food and Agriculture of the Central Provinces and Berar Government. The Agenda will include visits to Compost production Centres and tree planting demonstrations in adjoining villages.

## II. C. P. goes chead with Ordinance for Town Compost.

The Town Compost Scheme may be said to be nearing the final stages of its fulfilment in the action just taken by the C.P. Government in promulgating an Ordinance modifying Section 50 1(c) of the Municipalities Act taking power to compel municipalities to utilize their refuse material for Compost production. The text of the C.P. Ordinance is given in Appendix A.

It is expected that other Provincial Governments would follow suit, since town refuse is a valuable source of manure and in view of our chronic food deficiency, it should be utilised for increasing food production rather than for levelling land or for being burnt. Municipalities are heavy importers of

food from the surrounding agricultural areas and it is but fair that they should be made to realise their responsibility for keeping up the fertility of the agricultural areas by converting their refuse material into Compost manure.

It has taken 4 years of steady work under the Compost Schemes and the establishment of a national Government at the Centre and in the Provinces to pave the way for undertaking compulsory action against municipalities on the lines framed by the C.P. Government. If all other Provinces would follow suit, we would be in a position to prepare about 100 lakh tons of additional manure from this source alone, which would mean the addition of about 100-150 lakh maunds of food stuffs (vegetables and food grains) per year to the country's resources.

Far greater would be the volume of our extra production of food stuffs if legislation could be enforced through village Panchayats for preventing the burning of cow-dung as fuel in our villages and towns. For that, it is necessary that Village Panchayats should be established in our villages, so that they could undertake tree-planting and thus pave the way for a legal ban against the misuse of manure as fuel. Action is already being taken by several Provincial Governments to establish active Village Panchayats in their villages, and if our Compost drive could maintain its present momentum, it may not be surprising if our objective of a legal ban against the burning of cow-dung is achieved even within the next 5 or 6 years' time. Intensive propaganda among villagers is needed to achieve this goal.

#### III. Gwalior follows suit with Ministerial Order.

The Gwalior Government have taken up for consideration the implementation of the recommendations of the all-India Compost Conference held in Delhi in December last, and as a first step, the Hop Minister for Rural Welfare and Local Self Government, Gwalior, (Hon. Shrivut Sunnulal) has passed an order (No. 6'2004) compelling all municipalities within the State to adopt the Compost System. The order states:—"It is therefore notified through this departmental order that to bring into effect the recommendations of the Conference, all the refuse material collected within the limits of the municipalities should not be utilized for any other purposes excepting composting, and under no circumstances should uncomposted material be sold to any body;

further, that composting should be developed to its full production capacity within the next two years".

#### IV. U. P. legislates for village Compost.

On the initiative of the Hon. Minister for Development, U.P. (the Hon. Shri K. D. Malaviya) the United Provinces Legislative Assembly have passed a Bill (Act XXVII 1948) for the expeditious requisitioning of land in villages considered essential for the development of agriculture and improvement of the life of the community in rural areas. Statement of Objects and Reasons of the Bill mentions: "In order to increase the manuful resources of the Province. Government have launched a scheme for the preparation of village Compost. It is necessary to requisition land for Compost pits. The object of the Bill is to prescribe an expeditious procedure for requisitioning of land for these purposes and for other similar objects which Government may notify after previous publication, as e-sential for the development of agriculture and improvement of the life of the community in rural areas". The Bill provides for the requisition land for these objects on the request of Cooperative Societies or Village Gaon Sabhas and for entrusting the management of such land to such bodies. The text of the Bill is given in Appendix B.

The absence of sufficient vacant land in the immediate surroundings of the village is often a limiting factor for expanding Compost production in villages and the present Bill is sure to remove this difficulty. The entristing of the management of the requisitioned land to the Gaon Sabha is a move in the right direction, since the Sabha would at the same time undertake a responsibility for fulfilling the Compost programme. It is worth considering whether the provisions of the present Bill could not be utilized for starting tree plantations in village surroundings under the management of Gaon Sabhas, so that alternative fuel may be supplied in place of cow dung now burnt for one.

It is hoped that other Provinces would give a fillip to the Village Compost movement by adopting similar measures for rapid acquisition of necessary land for the purpose. A similar bill for the urban areas would also be necessary if municipalities are compelled to prepare Compost on the C.P. model. Most municipalities now do not possess. Compost Depots but dump their refuse any where in the suburbs and even inside the town limits.

## V. Compost Conference in Bombay.

On the initiative of the Hon. Mr. M. P. Patil, Minister for Agriculture and Forests, Bombay Province, a meeting of departmental heads and others interested in the Compost programme was held in Bombay on the 18th March 1948. The meeting was quite representative and was attended by several members of the Bombay Legislative Assembly and non-officials. Sir Datar Singh and Dr. C. N. Acharya represented the Government of India. The Secretaries to the Departments of Agriculture and Rural Development, Revenue, Local Self Government, Irrigation, the Registrar of Cooperative Societies, the Provincial Motor Transport Controller, the Director of Agriculture, the Milk Commissioner, Bombay, and the Officials in charge of Compost Schemes were also present.

The proceedings were on lines similar to the Conference on Compost that was held at Nagpur on 8th February 1948. The Conference considered the progress already made under the Urban and rural Compost Schemes in Bombay and the difficulties standing in the way of rapid expansion of the schemes so as to reach the potential maximum capacity as soon as possible. The Conference recommended that a Scheme should be prepared for the distribution of the cowdung stocks in the Bombay Suburban area to the agricultural areas in Thana, Surat and Kaira Districts. The Hen. Minister for Agriculture stated that a scheme was being sanctioned for the conservation of human excreta in villages and its conversion into Compost manure.

The Bombay Government have developed a net work of Rural Development Boards throughout the Province and the Hon. Mr. M. P. Patil promised the active cooperation of the District Rural Development Boards in pushing through the Compost programme both in the towns and in the villages.

## VI. Other Compost activities in Bombay Province.

In accordance with the suggestions made at the Bombay Compost Conference two new Compost Schemes have been sanctioned by the Bombay Government and are now in operation, viz. (1) Scheme for the utilization of cow dung stocks from the Bombay suburban areas and (2) Scheme for the utilization of human excreta in villages by its conversion

into Compost manure. The first scheme aims at transporting by railway from the Bombay suburban area about 20,000 tons of cow dung manure and distributing it to the cultivators about 150-200 miles away in Surat and Kaira The total cost of collection and transport over 200 miles comes to about Rs. 8|- per ton of manure (50 cu. ft.) there is good demand for the manure in Surat and districts. The second scheme is on a pilot scale and proposes to start masonary trench-latrines on the Wardha selected villages in each district. This scheme will be worked in close cooperation with village Panchavats ad-hoc village committees. The villagers will provide free labour and the Government will provide materials for construction, of trench-latrines and the protecting sheds.

Sir V. T. Krishnamacharya, Dewan of Jaipur State, in his Presidential Address at the Bombay Provincial Cooperative Conference held in Bombav on 11th April 1948, made a strong plea for Compost production on the large scale as an important step in the Grow More Food Campaign. He said "of fundamental importance under this head is to organize a country-wide campaign for the conversion of all village and town refuse into Compost...... A nation-wide for compost-making should be organized. Α machinery should be speedily brought into existance for seeing that this is done". The Government of India have, in anticipation of the above suggestion, already constituted the Manure (Compost) Development Committee, which is charged with the above duty and is holding its first meeting Nagpur in July 1948. It remains to be seen how Committee is able to fulfil the objective envisaged by Krishnamachari that "a nation-wide campaign for compostmaking should be organized".

On the 26th May 1948, a regional Conference on Compost was held at Ahmedabad under the auspices of the District Board. Ahmedabad. Rural Development The Development Officer to the Government of India the meeting. The representatives of different municipalities Ahmedabad district were present and the difficulties met with by them in undertaking post production activities at their respective centres. is being taken by the Provincial Government Officers to remove the above difficulties and to enable the municipalities to fulfil the targets of manure production fixed for them

#### VII. Bengal Starts Sludge Distribution Scheme.

Calcutta city is producing about 130 million gallons of sewage per day, which is treated in 2 sedimentation tanks at Bantab (about 8-9 miles from the city) and the sludge produced is let into lagoons for drying. The annual production of dried sludge may be estimated at about 50,000 tons, but the quantity of old dried manure now in stock is much higher and may be estimated at about 500,000 tons. The manure is of good quality and contains when fresh about 2 per cent. of nitrogen and about 1 per cent. P<sub>2</sub> O<sub>5</sub> (on the dry basis). The main difficulty is one of transport, since the area wacter sludge is prepared (south-east of Calcutta) is low lying land and there is little demand for manure in that vicinity; and the manure has to be taken to the northern and north-western areas, by railway to a distance of 50 to 100 miles.

The West Bengal Government have recently sanctioned a scheme for the utilization of the above dried sludge by transporting it by motor trucks and railway wagons to different agricultural regions of Western Bengal. The total cost of collection and transport comes to about Rs. 12 per ton. In view of the higher percentage of nitrogen and phosphoric acid compared to town compost or farmyard manure, dried sludge may be considered to be worth the above expenditure on transport.

## VIII. Gandhiji on the Delhi Compost Conference.

Mahatma Gandhi wrote in the 'Harijan', dated 28th December 1947, the following comments on the Compost Conference held in Delhi in December last:—"This month the All-India Compost Conference held its session in New Delhi to consider the question of large scale expansion of Compost production in India. Shrimati Mira Behn was the organizer and Doctor Rajendra Prasad presided over the Conference Doctor Acharya, Sir Datar Singh and other well known workers in the line took part in the proceedings. Many important resolutions were passed regarding the development of urban and village Compost. A sub-Committee was formed to draw up a scheme for village sanitation consisting of the Shrimati Mira Behn, Hony, Advisor, to II P. Govt.

- (1) Shrimati Mira Behn, Hony. Adviser to U.P. Govt.; (2) Shri Shiv Kumar Sharma (Editor "Krishi Sansar");
- (3) Doctor B. N. Lal (Provincial Biochemist U.P.):
- (4) Doctor K. G. Joshi (Provincial Biochemist, Central Provinces).

"Plans were prepared for the conversion of all urbanrefuse such as sewage, sludge, mill-wastes, slaughter-house wastes, like blood, bones, leather and other waste material like excreta, dung, urine, sugar-cane trash, water hyacinth, etc., into good quality compost manure.

"If the above proposals do not merely stop on paper, they are bound to yield great benefit to the people. The most important thing, however, is that this work should be carried out on a big scale all over India. To do this, many more Mira Behns should come forward to spread this work. only the willing cooperation of the people of India could be obtained in this matter, the food problem of the country would immediately disappear and we can produce even in excess more food than what is required by Organic manure always make the soil more fertile and would not weaken it. Regular composting of our refuse by adopting proper methods would save us crores of rupees worth of manure and increase our food production correspondingly. In addition, such proper collection of refuse would keep the villages clean and as we consider cleanliness to be next to Godliness, promote healthy life."

## 1X. Village Compost Schemes.

The Town Refuse Compost Scheme has now been in successful operation for the last 4 years, the procedure of composting has been standardized and the difficulties with in executing the scheme are being rapidly But the Village Compost Scheme is still in its initial stages of development, the technical methods still remain standardized and popularized and the scheme bristles with more problems and difficulties than the Town The refuse materials available in rural areas for compost making fall under two main heads, viz. (a) special types of refuse available in large quantity in certain special areas, c.q., forest leaves, sugar-cane trash, water hyacinth, cotton stalks, paddy or groundnut husk, etc., and usual type of refuse available in villages e.g., cattle-shed wastes (like dung, litter and urine) house sweepings, wood ash, road and vard sweepings, leaf fall, and also the wastes, weeds, etc., brought from the farm to the village for the purpose of urine absorption in the cattle-shed. Out of the above 2 groups; (b) is much larger in quantity (amounting to about 400 million tons) compared to (a) (which is

estimated at about 20 million tons). While we cannot afford to waste any source of manure and should prepare schemes for utilizing the material available under group (a) our attention under the Village Compost Scheme should primarily be concentrated on the materials coming under group (b).

The efficiency of manure preparation in our villages is on the average poor, both in respect of quantity and quality. A good portion of the dung and litter variously estimated at 40 per cent.—60 per cent. is burnt for fuel, thus affecting the quantity of manure prepared. The quality is generally poor (0.7 to 0.8 per cent. nitrogen on the dry basis) due to the non-adoption of even simple methods for conservation of cattle urine. Our data as regards the average quantity of manure prepared per head of cattle in the villages and its average chemical analysis is so meagre that no Provincial or all India estimates can be based on such data.

Our primary aims under the Village Compost should therefore be (a) to increase the quantity of manure prepared in the villages upto target limits based number of cattle maintained in the villages; for this purpose it would be necessary not only to adopt more systematic collection of refuse from farms and village surroundings but also to prevent the burning of cattle dung by scheme of tree planting in villages; and also (b) to improve the quality of manure prepared, so as to raise the nitrogen content to a level of 2.0 per cent, or higher by adopting simple methods of urine conservation and improved methods of manure preparation. In order to compare progress made from year to year, it is necessary to have at the start statistically analysed data for each District collected from villages selected in random, indicating the quantity of manure prepared per year and the number of adult cattle maintained. Action should be taken on this point, before Village Compost Schemes are started: otherwise the degree of progress made cannot be quantitatively measured.

In order to ensure rapid increase in quantity of manure applied to land, it is necessary that tree-planting should form an integral part of the Village Compost Scheme. If the tree planting programme is to become a success, it is essential that the scheme should be operated through the Village Panchayats or ad-hoc Village Committees who could take up responsibility for proper local supervision. It would be

useful to select in the beginning only those villages where local response is keen. The example of such villages, once they start operating the scheme, is sure to spread to the remaining villages.

#### X. Cost of production and Distribution of Compost.

The cost of production of Compost is an important factor which decides the economic solvency of the Compost Programme. Under the urban Compost Scheme, the cost of production will include such factors as (a) cost of digging trenches (spread over 3 years in the case of katcha trenches which can be used for 3 seasons without major repairs); (b) Labour charges for filling up the trench with refuse (katchra and night-soil); (c) Technical supervision (including overseers or Sanitary Inspectors maintained by the Municipality and the technical staff maintained by Government under the Compost Scheme); (d) Labour charges for taking out the manure from trenches when ready and sieving the same before sale. The total expenditure, divided by the output of manure per year, gives the cost of production per ton of manure produced.

Since Compost is a bulky manure and transport is costly round about towns, it is the practice at most centres for the municipalities to employ their trucks for distributing the manure within a specified distance, say 10 miles. In such cases, municipalities often charge a flat rate which includes both the cost of production and distribution and represents the price of compost delivered within 10 mile radius.

Provincial Compost Officers should collect statistics from all the municipal centres operating the compost scheme, indicating the cost of production and distribution of compost incurred by them—how much of the above expenses are met by subsidy from Government and how much is recovered from the farmers. It must be the objective of a sound compost scheme to establish at each centre, a chain represented by the links, Municipality—cooperative society of vegetable growers, fruit growers, gardeners and agriculturists in the area immediately surrounding towns—actual vegetable growers, gardeners and agriculturists. The Cooperative Society should purchase whole of the Compost prepared by the municipality and arrange for its equitable distribution

among its members in motor trucks operated by them. Such a chain is likely to remain a permanent feature—able to with stand the stress and strain of changes in economic conditions from year to year.

#### XI. Village Sanitation.

In the description given in Appendix B of Compost Bulletin Vol. 1, No. I, under the "Screened enclosure method for women and children in villages", Shrimati Mira Behn desires to add the following further particulars:—viz: "The enclosure is screened off on one side only, that is to say, the side where some public path or road may pass. The other sides, which may face waste land or fields may be left open......Further, after clearing away the night-soil, the bhangi should each time sprinkle a little dry earth, ash or katchra over the place."

## XII. Statistics of Compost Production and Distribution.

The latest available statistics of compost production and distribution in different Provinces and States, are presented in Appendix B.

#### APPENDIX A.

# CENTRAL PROVINCES AND BERAR ORDINANCE. No. IX of 1948.

The Central Provinces and Berar Municipalities (Amendment)
Ordinance, 1948.

An Ordinance further to amend the Central Provinces and Berar Municipalities Act, 1922.

Whereas the Governor of the Central Provinces and Berar is satisfied that circumstances exist which render it necessary further to amend the Central Provinces and Berar Municipalities Act, 1922.

And whereas the Provincial Legislature is not in session;

Now, THEREFORE, in exercise of the powers conferred by Section 88 of the Govt. of India Act, 1935, the Governor of the Central Provinces and Berar is pleased to make and promulgate the following Ordinance:--

- 1. This Ordinance may be cited as the Central Provinces and Berar Municipalities (Amendment) Ordinance, 1948.
- 2 For clause (c) of sub-section (1) of Section 50 of the Central Provinces and Berar Municipalities Act, 1922, the following clause shall be substituted, namely:—
  - "(e) disposing of night-soil and rubbish and if so required by the Provincial Government preparation of Compost-manure from night-soil and rubbish".

(Sd.) MANGAL DAS PAKVASA,

Governor.

į

Central Provinces and Berar.

PACHMARHI; The 14th May 1948.

#### APPENDIX B.

# THE UNITED PROVINCES RURAL DEVELOPMENT (REQUISITIONING OF LAND) ACT, 1948.

ACT NO. XXVII OF 1948

(AS PASSED BY THE U. P. LEGISLATURE).

AN

#### ACT

to provide for the requisitioning of land to promote the improvement and development of agriculture and economic condition in rural areas.

WHEREAS it is expedient to requisition land required for the development of agriculture and economic condition in rural areas and to prescribe an expeditious procedure for the determination of compensation to be paid on account of such requisition:

It is hereby enacted as follows:

- 1. Short title, extent and commencement.—(1) This Act may be called the United Provinces Rural Development (Requisitioning of Land) Act, 1948.
  - (2) It shall extend to the whole of the United Provinces.
- (3) This section shall come into force at once and the remaining sections shall come into force on such date and in such areas not being areas for the time being included in any municipality, cantonment area or notified area as the Provincial Government may by notification in the official Gazette specify in this behalf.
- 2. Definitions.—In this Act unless there is anything repugnant in the subject or context—
  - (1) "Compensation Officer" and "Requisitioning Authority" mean the Compensation Officer and the Requisitioning Authority appointed as such by general or special order by the Provincial Government provided that such person shall be the Collector or an Assistant Collector nominated by the Collector.
  - (2) "Public purpose" means for and in connexion with any of the following objects, that is to say,
    - (i) making, enlarging or deepening of tanks for purposes of irrigation;
    - (ii) composting of village refuse or preparation of any other form of manure;

- (iii) construction of guls for irrigation;
- (iv) plant nurseries:
- (v) any other object which the Provincial Government may, after publication in the Gazette and after considering any objection or suggestion which may be received by notification in the Gazette, declare essential for the development of agriculture or improvement of the life of community in rural areas.
- (3) "Land" includes tanks and things attached to the earth or permanently fastened to anything attached to earth.
- (4) "Prescribed" means prescribed by the rules made under this Act.
- (5) "Provincial Government" means the Government of the United Provinces.
- (6) The expressions "Rent" and "Sayar" shall have the meaning respectively assigned to them in the United Provinces Tenancy Act, 1939.
- 3. Procedure of requisition.—If in the opinion of the Requisitioning Authority, it is necessary or expedient so to do for a public purpose, it may, by order, requisition any land by serving on the owner and occupier thereof and, when the owner or the occupier is not readily traceable, or the ownership or the right to occupation of the land is in dispute, or owing to the number of persons entitled as owner or occupier, it is not reasonably convenient to serve everyone of them separately, by publishing, in such manner as may be specified in that behalf, a notice stating that the Requisitioning Authority, has decided to requisition it in pursuance of this section, and may make such further orders including orders relating to the disposal, possession and enjoyment of any trees and other crops of any person standing on such land as appear to it, to be necessary or expedient in connexion with the requisitioning.
- 4. Use of requisitioned land—Where any land has been requisitioned under section 3 the Requisitioning Authority or such other authority as may be prescribed may use it in such manner as may appear to it to be expedient for any public purpose.
- 5. Powers of the Requisitioning Authority.—(1) The Requisitioning Authority may with a view to requisition any land under section 3 or determining the compensation therefor by order—
  - (a) require any person to furnish to such authority as may be specified in the order such information in his possession relating to the property as may be so specified, and

- (b) direct that the owner or the occupier or person in possession of the land shall not, without the permission of the authority making the order, dispose of it till the expiry of such period as may be specified in the order.
- (2) Without prejudice to the powers conferred by sub-section (1) any person or authority appointed in this behalf by the Requisitioning Authority may enter any land and inspect it for the purpose of determining whether, and if so in what manner, an order under section 3 should be made in relation to such land, or with a view to securing compliance with any order made under section 3.
- .6. Application for requisition by a Soviety or Union.—A Society or a Union registered under the Co-operative Society Act, 1912, or a Gaon Sabha under the United Provinces Panchayat Raj Act, 1947, may in the prescribed manner apply to the Requisitioning Authority to requisition any land for a public purpose specified in the application.
- 7. Declaration by the Requisitioning Authority on an application by a Society or Union.—If the Requisitioning Authority, after
  such inquiry and in such manner as it may deem fit, is satisfied that
  the land mentioned in the application under section 6 is needed and
  is suftable for a public purpose, it shall make a declaration to that
  effect and except as provided in section 14 the same shall be final and
  conclusive.
- 8. Requisition of land after declaration under section 7.— Whenever any land shall have been so declared under section 7 to be needed or suitable for a public purpose, the Requisitioning Authority may, subject to the general control of the Provincial Government, requisition such land and the provisions of this Act, in so far as they may be applicable shall apply to such land.
- 9. Payments of compensation.—(1) Where any land is requisitioned under section 3, there shall be paid to every person interested which compensation as may be agreed upon in writing between such person and the Requisitioning Authority in respect of—
  - (a) the requisitioning of such land, and
  - (b) any damage done during the period of requisitioning to such land other than that which may have been sustained by natural causes.

Explanation.—For the purposes of this sub-section the deepenring of a tank, making of pits for composting village refuse is not damage done to the land.

- (2) Where no such agreement can be reached, the Requisitioning Authority shall refer matter with his recommendation as to the amount of compensation and the reasons therefor to the Compensation Officer and also direct the person claiming compensation to appear before such officer on such date as may be specified and the Compensation Officer shall, on the date fixed in that behalf or on any other date to which the hearing may be postponed, hear such person and after such further inquiry as he may deem fit, determine the amount of compensation which shall, except as provided in section 12, be final and conclusive.
- (3) The Compensation Officer shall in fixing the amount of compensation have regard to—
  - (a) the rent, if any, assessed on the land which has been requisitioned;
  - (b) the sayar income, if any, derived from such land;
  - (c) the value of any trees which as a result of the requisition have to be removed from the land, and
  - (d) the purpose for which it has been requisitioned and shall also take into consideration the benefit which the use of such land is likely directly or indirectly to confer on any other property owned or occupied by such persons.

#### But he shall not take into consideration-

- (i) the value of trees, except trees mentioned in clause (c), which may continue to be possessed and enjoyed by the person entitled thereto,
- (ii) the value of any crops which may be existing on the land at the time of the requisition and may be removed by him after such time as the Requisitioning Authority may specify in that behalf,
- (iii) the value of any right of any person in or over the requisitioned land enjoyment whereof has not been suspended or otherwise prohibited.
- (4) The compensation fixed under sub-section (1) determined under sub-section (2) shall be paid in such manner as the parties may agree or as the case may be, the Compensation Officer may direct.
- 10. Release from requisition.—(1) Where any land requisitioned under section 3 or 8 is to be released from requisitioning, the Requisitioning Authority may, after making such inquiry, if any,

as it considers necessary, specify by order in writing the person who appears to it to be entitled to the possession of such land.

- (2) The delivery of possession of such land to the person specified in the order made under sub-section (1) shall be a full discharge of any liability of the Provincial Government to deliver possession to such person as may have rightful claim to possession thereof but shall not prejudice any right in respect of such land which any other person may be entitled by due process of law to enforce against the person to whom possession of the land is so delivered.
- (3) Where the person to whom the possession of any land requisitioned under section 3 or 8 is to be delivered cannot be found or is not readily traceable or has no agent or other person empowered to accept delivery on his behalf, the Provincial Government shall publish in the official Gazette a notice declaring that such land is released from requisitioning and shall cause a copy thereof to be affixed on some conspicuous part of such land.
- (4) When a notice referred to in sub-section (3) is published in the official Gazette, the land specified in such notice shall cease to be subject to requisitioning on and from the date of such publication and shall be deemed to have been delivered to the person entitled to possession thereof.
- (5) Upon delivery of possession under sub-section (2) or (4), the Provincial Government shall, save as directed by any order made under section 9, not be liable for any compensation or other claims in respect of such land.
- 11. Vesting of the management and superintendence of requisitioned land.—The Requisitioning Authority may vest the management and superintendence of any land requisitioned under this Act in the Co-operative Society or the Union or the Gaon Sabha on such terms and conditions as may be prescribed and any land so entrusted to any society, union or gaon sabha shall be managed in such manner as may be prescribed.
- 12. Review of the order passed by the Requisitioning Authority.—
  The Provincial Government or the prescribed Authority may review
  the order passed by the Requisitioning Authority under section 7 or
  by the Compensation Officer under sub-section (2) of section 9, if
  it is satisfied that grave injustice has been done to a party.
- 13. Dues of the Provincial Government recoverable as arrears of land revenue.—Any charges payable to the Provincial Government by a Co-operative Society, Union or Gaon Sabha or the members

of such body under the provisions of this Act or the rules may be recovered from the socity, union or sabha or their members, as the case may be, as arrears of land revenue.

- 14. Court not to question any order passed under the Act.—
  (1) No order made in exercise of any power conferred by or under this Act shall be called in question in any court except as provided in this Act.
- (2) Where an order purports to have been made and signed by any authority in exercise of any power conferred under this Act, a court shall within the meaning of Indian Evidence Act, 1872, presume that such order was so made by that Authority.
- 15. Protection of persons acting under the Act.—(1) Except as provided in this Act no suit or other legal proceeding shall lie against any person for anything which is in good faith done or intended to be done in pursuance of this Act or any rules or orders made thereunder.
- (2) No suit or other legal proceeding shall lie against the Provincial Government for any damage caused or likely to be caused by anything in good faith done or intended to be done in pursuance of this Act or any rule or order made thereunder.
- 16. Rule-making power.—(1) The Provincial Government may make rules consistent with this Act for the purpose of carrying out the provisions of this Act.
- (2) In particular and without prejudice to the generality of the foregoing powers such rules may prescribe:—
  - (a) the particulars which shall be entered in any application for requisition made by a co-operative society or union or a gaon sabha;
  - (b) the procedure to be followed in inquiries held by the Compensation Officer, or the Requisitioning Authority;
  - (c) the charges and the terms and conditions subject to which the management and superintendence may be vested in a co-operative society, union or gaon sabha;
  - (d) the manner and the principles on which the rents and sayar may be determined in the case of requisitioned land:
  - (e) the authority which can review under section 12 the order passed by the Requisitioning Authority and the precedure to be followed by it; and
  - (f) any other matter which is to be or may be prescribed,

#### APPENDIX C.

# STATISTICS OF COMPOST PRODUCTION AND DISTRIBUTION.

## I. Urban Compost Scheme.

Provinces and States.	Period for which la- test statis- ties recei- yed.	No. of Gen- tres oper- at- ing.	Vol. of Compost prepar- ed during the peri- od (2/3 basis)	Vol. of Gompost sold during the period	Total Vol. of Com- post sold during the financial year from 1st April	Vol of unsold Compost (Old & New) in stock at the end of the period
8.	b	0	d	6	f	g
			cu. ft.	ou, ft,	ou. ft.	eu. ft.
1. Ajmer-Merwara	1-4-47 to 31-3-48	4	1,72,890	90,300	90,300	4,23,270
2. Baroda	1-10-47 to 31-12-47	15	9,100	$Ni^{\dagger}$	89,100	79,700
3. West Bengal.	1-1-48 to 31-3-48	29	1,02,350	1,16,900	3,79,675	3,13,165
4. Bihar	1-4-47 to 31-3-48	18	4,75,960	3,29,850	3,29,850	7.82,520
'5. (Bombay	1.4.47 to 31.1.48	44	2,47,645	1,15,290	1,45,290	1.7
6. Central Provin- ces and Berar.	1-1-48 to 31-3-48	65	8,05,650	11,18,650	15,08,850	18,15,910
7. Cochin State	1-7-47 to 30-9-47	6	28,102	20,126	35,916	1,08,432
8. Delhi	1.1.48 to 31.3.48	4		86,530	2,72,350	
9. Hyderabad State.	1-1-48 to 31-3-48	35	39,684	19,208	3,07.388	5,42,004
10. Gwal'or State	1-4-46 to 31-3-47	16	4,98,220	3,69,825	3,69,825	
11. Madras	1-10-47 to 31-12-48	81	12,54,114	4,83,187	26,37,681	52,38,397
12. Mysore	10-1-47 to 31-12-47	76	3,42,460	2,04,000	4,09,550	13.36,110
13. Oriese	1-10-47 to 31-12-4	7	31,470	7,920	99,810	4,36,350
14. East Punjab	Do.	7	75,550		32,570	2,04,933
15. Travancore	Do	14	89,903	43,525	3,92,668	3,31,208
16. United Provin	1-1-48 to 31-3-48	147	31,57,720	24,03,640	74,31,510	59,91,990

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## II. Village Compost Scheme.

Name of the Province.	Period for which latest statistics received.	No. of Villages operating the scheme	Total vol. of manure prepared during the period	put on land during the	Volume of manure in stock at the end of the period.
8	b	U	d	ө	f
			cu. ft.	cu. ft.	ou. ft.
1. Assam	1-7-47 to 30-9-47	542	3,44,689	1,44,564	2,00,125
2. West Bengal	Do.	1,596	5,01,417	3,60,570	2,65,960
3. Bombay: (a) Cooperative Compost Scheme.	Do.	281	12,01,448	2,29,212	9,72,236
(b) Rural Compost Scheme.	Do.	957	2,05,710	Nil.	2,13,018
4. Coorg	1-1-48 to 31-3-48	175	4,94,286	Nil.	4,94,286
5. Madras	1-10-47 to 31-12-47	1,868	3,67,213	2,82,552	1,98,932
6. Orissa	Do.	79	1,84,350	3,22,720	3,04,890
7. East Punjab	Do	129	5,83,329	7,25,325	6,41,512
8. United Provinces	Do	3,248	80,31,318	1,28,14,755	45,80,994

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# **COMPOST BULLETIN**

## (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

Issued by the Compost Development Officer, Ministry of Agriculture, Government of India.

VOL. 1, NO. 3.

SEPTEMBER, 1948

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## COMPOST BULLETIN

## 1. C. P. Provincial Compost Conference.

The Joint Session of the Central Provinces and Berar Provincial Compost Conference and the Central Manure (Compost) Development Committee, held at Nagpur on the 5th to 7th July 1948, proved a great success and helped to place Compost work in the Central Provinces and Berar on a firm foundation. The Conference was opened by H. E. Shri Mangaldas Pakvasa, Governor of the Central Provinces and Berar, who in a forcible speech supporting the Compost Programme stated:—

"Several times in my speeches I have stated that in my opinion there are two matters of extreme importance at the present time., viz., Food and Defence. Food is a provincial subject and our province is paying very great attention to this most important subject. Therefore, when I received an invitation to inaugurate this Conference, I was very happy and I readily agreed, as I feel that the questions before this Conference are of such vital importance that if they tackled successfully and in their entirety, the present food problem in the country could be satisfactorily solved. For augmenting food production today, we have been spending crores and crores of rupees for importing lot machinery and manures, which are costing our poor country a good deal of money. But if we could increase our manurial supply by a proper utilization of wastes, rural and urban, which we have in abundance in our country today, we could produce all our food requirements practically at no cost. is a sad reflection but none the less true that instead of placing so much reliance on imports whether of food, machinery or manures, and spending so much of our hard earned money, had we taken steps to place our own house in order we could have achieved much more by now than what we have done.

"Gandhiji had realised this long before, and with his characteristic intuition had long stressed the importance of this subject. I am happy at the thought that we have assembled here for furthering a cause so dear to his heart and I wish we now take decisive steps to give a practical shape to his idea, so that all the available wastes in the towns and villages

such as cattle dung, farm refuse, human excreta and town refuse are composted and properly utilised. This will also help to solve the problem of rural sanitation which also demands our immediate attention.

- "I hope this Conference will also consider certain allied questions such as the increase of the fuel resources of the rural areas, to induce rural composting on universal scale; making rural composting popular and attractive by demonstrations, prizes, etc., and replacing the common village "Choola" by an oven which would consume less fuel.
- "A great and persistant effort will be required to do all these things. The value of propaganda cannot be under estimated. It is very necessary that a large portion of India should become manure-minded. I am told that credit for being highly manure-minded has been given by students of this subject to Japan. The work is enormous but it has to be done.
- "I would like to finish with a note of urgency and the importance of efficient administrative action. The problem of rural composting presents vast administrative difficulties. It involves the changing of an age long custom of burning cattle dung as fuel and conserving it in a particular way as manure. But that is the only way in which we can meet the situation today and it is for the solution of this problem that we have assembled here today".

The Hon. Shri R. K. Patil, Minister for Food and Agriculture, C.P. and Berar, in welcoming the delegates to the Conference said:—

- "Amidst the prevailing shortages of all things there is one thing we have in plenty. I am referring to the large population that we have to support—human and cattle, and the large waste that they produce every day, which can be composted and utilized as very good manure. It is to consider the best ways and means of utilizing this that we have assembled here today.
- "His Excellency in his speech has asked us to become manure-minded. I think he has used a very fine expression. It is in this attitude that I see the solution of the whole of our food problem. It has been computed that our 4,000 towns in India can produce 60 lakhs tons of good quality compost manure, which would increase our food supplies by 150 to

200 lakh maunds and the 5 lakks of villages in the Indian Union will yield an extra manure production of 200-300 million tons which would give about 300 million maunds of extra food-grains. The total extra food to be obtained from composting town and village refuse and other waste material comes to nearly 10 to 12 million tons. The importance of this figure can be realised when we contrast it against the annual import of 2 million tons of food-grains and the total Indian food deficit which is estimated at 5 to 6 million tons. Excellency has well pointed out, where is the necessity of spending crores and crores of rupees on importing foreign food stuffs, machinery, fertilisers, etc., when by expanding our activities so that the full manure potentialities of towns and villages can be exploited we can produce not only what we import today, but five to six times that figure, and all this can be secured by mere change in outlook of the cultivator by making him more manure minded that at present.

"I agree that the administrative problem involved is not The age long custom of burning cow dung has to be The equally age long custom of allowing cattle stopped. urine to be wasted away and not using it as manure has also to be stopped. The prejudice against handling and using it as manure has also to go. But the prize to be achieved is so attractive that the problem, though difficult, must be overcome. After all, nothing is worth trying which is not difficult to achieve. I would, therefore, request this Conference to make practical suggestions for utilising completely as possible the manurial resources of the urban and rural areas. The problem in the rural areas is more difficult. In addition to the prejudice, there is the lethargy of the cultivator. His latent faculties have to be aroused. He is to be made to realise the wastefulness of his present methods and the advantages, economic and sanitary, becoming manure minded."

The Hon. Shri Jairamdas Daulatram, Minister for Food and Agriculture to the Government of India, who presided over the Conference, delivered an Address pregnant with thought and mature conclusions. He rightly pointed out:—

"There is a legitimate complaint that much confusion of thought exists in regard to the economic activity of the nation. There is plenty of motion, but little progress. Planless movements obstructing and cutting into each other will

not take the people towards the goal of prosperity and well-being. To check and prevent planless movements, we must be clear in our objective for the coming decade. That objective must be concrete and definite. It cannot be a mere copy of the present economic activity in the United States, Britain, Russia or elsewhere. That objective must be correlated to the special circumstances in India and to the needs of the nation arising out of those circumstances. We will not be behind the world simply because we move along our own line, the line indicated above. I have not the shadow of a doubt that if India could secure a big rise in the production of agricultural wealth, it will have secured the means of fullest all round economic and industrial development.

"It is in this setting and with this background that we must view the place of natural manure called compost in the programme of the nation. There are large schemes, as we all know, for the development of agriculture in this country. The Foodgrains Policy Committee has outlined a stupendous programme of reclamation of waste lands. This has its value. It has also emphasised the need of rapid completion large irrigational and hydro-electric schemes to speed up adequate supply of water through canal and wells to new lands thirsting for irrigation. This also has its value. But while these schemes would increase the total wealth of the country as a whole, they are bound to take considerable time before their full fruit is reaped and enjoyed. The problem of increasing quickly the standard of living of the crores who till the soil in the irrigated and well-watered parts of India calls for urgent attention. Where man-made and God-sent water supply is ample, the rapid extension of the use of compost is an imperative necessity. I have no doubt that those who are gathered here know the fundamental facts on which the compost programme is based. But these fundamental facts will bear repetition. They need repetition. They need to be dinned into our ears repeatedly. We invest over a hundred crores of rupees to beg for ourselves food from the nations of the world. We use up valuable taxpavers' money to subsidise the sale of this food by deficit provinces and states in the country. In the process, we are not able to maintain a proper quality for this foreign food. We make our masses hang on to the inadequate quota of this grain served out to them from ration or from relief shops, and all this because we, the Governments and the agriculturists, cannot between

ourselves take the steps that are necessary to produce onetenth more than what we do today. Without the aid of any large extension of mechanised cultivation or the use of artificial fertilizers, the fields of China give to their nation twice the quantity of paddy or wheat per acre that our Indian fields can produce, and this is because the Chinese agriculturist gives to his field the food nature has designed for it. thirty centuries, and probably many more, all the wastes, all the refuse, all matter that otherwise might rot and be a source of disease and epidemic is conserved and transmuted healthy food for the nation's fields. All animal manure including both dung and urine from cattle, sheep, goats, horses, camels, pigs and poultry, latrine matter, both liquid and solid, all kitchen waste and offal, old paper, worn out clothes, bones, street sweepings, wood or cow-dung ashes, weeds, manure, cane trash, fallen leaves, dried vegetation, slaughterhouse waste and leather waste, all this is searched and gathered from every road, street and path-way, from every home in the cities or the villages, and out of this vast waste is produced vast national wealth, and out of the double yield which China gets from every acre as compared with India is maintained a population far more numerous than our own. has been estimated that it is possible to produce in our country 500 million tons of this natural manure we call 'Compost' from the waste that disfigures six and half lakhs villages, and by using this waste properly, we can produce enough rice and wheat and millets to feed a population 50-60 crores of Indians, whereas to-day we are a nation of only 35 crores. For all this magnificent result we need not go on begging to any foreign country either for agricultural machinery or for fuel oils to run it, nor invest crores 'valued taxpayers' money. Nothing stands between us and this goal of doubling our crops than the lack of adequate governmental organization and the inertia of the cultivators. For four years enthusiasts in the governmental and private ranks have tried to place this compost programme before the All movements in their infancy have a slow pace. Only about 15 per cent of municipal towns have taken with differing efficiency to manufacturing compost of the refuse. 85 per cent. of the towns have yet to be conquered. Hardly seven thousand out of our six and a half lakhs villages are converting the village waste into food for their fields. A large distance has to be covered before India overtakes China on a road where the eastern countries of China. Japan and Korea lead the world

"I do not want to enter into the controversy of natural as against artificial manures. But we are importing about a lakh and a half tons only of foreign fertilizers. get no more for the present from outside. There is and will continue to be a world shortage. 'We are producing roundabout 50,000 tons of artificial manure in our existing factories. All this is a flea-bite. Much of it is priced too high for ordinary agriculturist who grows paddy or wheat. famous fertilizer factory at Sindri, yet in the making, is expected to produce 3½ lakh tons of fertilizers per year. And yet if we consider the total needs of our country, we must set up in India as many as fifty such Sindri factories before these needs are met. What all this means in terms of time, foreign plant, invested capital, mechanical and technical personnel can be easily estimated and appreciated by those interested in developing agricultural production in the country.

"It is in this context that we must judge the importance of immediate and adequate effort by governmental machinery and the agriculturist to prevent a further waste of our national wastes and convert all this refuse of towns and villages into health giving nutrition for India's hungry and thirsty farms. Converting these wastes into national wealth should be a programme of first-hand importance, if we are to take the correct attitude in regard to the means of speedy agricultural production, and if we are to give to agricultural production its proper place in the process of increasing national prosperity and raising the standard of living of our people."

A detailed copy of the proceedings of the joint session of the Provincial Conference and the Central Manure (Compost) Development Committee has been printed separately and would be supplied to readers on request.

# 2. First Meeting of the Central Manure (Compost) Development Committee.

The Government of India constituted in March 1948 (Gazette of India, dated 20th March 1948, Part I, Section 1, pages 338-339) a Standing Committee known as the Central Manure (Compost) Development Committee, with the following terms of reference:—

(i) to review periodically the progress of Compost production and allied schemes in India:

(ii) to work out detailed plans for increasing the rate of Compost productin in the country, so as to cover the whole of the refuse material available in the rural and urban areas;

.i.:

- (iii) to consider such other manurial schemes and plans as may be entrusted to the Committee by Government of India from time to time;
- (iv) to hold meetings at least once in 6 months in order to review the work done and frame a programme for the next 6 months;
- (v) to organize Provincial Compost Development Conferences and Committees in different areas for the purpose of coordination and intensification of work in those areas:
- (vi) to undertake and organize intensive propaganda for securing complete development of local manurial resources, and
- (vii) to take such other steps as may be needed to achieve the objects of the Committee.

The first meeting of the Committee was held at Nagpur on the 5th—7th July 1948, under the Chairmanship of the Hon. Shri Jairandas Daulatram. In addition to the members of the Committee, distinguished visitors like the Hon. Shri R. K. Patil, Shri Aryanayakam and Shrimati Shanta Bhai Narulkar were also present.

The Secretary in his Report reviewed the present position of the urban and village Compost Schemes and pointed out the difficulties standing in the way of accelerating the pace of Compost production.

The Committee considered in detail the steps to be recommended to the Central and Provincial Governments for securing a rapid increase of compost production in the country and passed the following resolutions:—

#### RESOLUTIONS.

# No. 1. Legislation to enforce the Composting of urban refuse by Municipalities.

\*Resolution: "This Committee is of the opinion that the stage has been reached when Provincial and State Governments should undertake legislation to amend their Municipal and other Local Legislation

Acts so as to give power to their Governments to compel local bodies, in all areas where conservancy arrangements exist, to convert their refuse and night-soil into compost manure before disposal ".

#### No. 2. Supply of Motor Trucks for Compost work.

Resolution: "This Committee feels that while preference should be given to the use of bullock-carts for the distribution of compost manure round about towns and trials should be made on these lines at certain selected centres, still in view of the serious shortage of transport at present existing at most urban centres, recommends that use should be made of motor-trucks for the above purpose. above connection they recommend that a directive should be issued. to Provincial and State Governments to the effect that motor trucks already allotted to them should not be supplied for purposes other than for defence and food transport till the requirements of compost work are completely met; and if this arrangement fails to supply the required number of motor-trucks needed for compost production and distribution from urban refuse, Government of India should arrange to import the required number of motor-trucks for the above purpose and supply the same through the Provincial Governments Municipalities and Cooperative Societies operating the schemes".

# No. 3. Legislation for expeditious requisitioning of land in village surroundings for common good purposes of the village including compost making and tree planting.

Resolution: "This Committee desires to draw the attention of Provincial and State Governments to the legislation recently passed by the U.P. Legislative Assembly (The United Provinces Rural Development (Requisitioning of Land) Act, 1948) which makes provision for the expeditious requisitioning of land needed for common good purposes of the village, including Compost making and tree planting for fuel, and in view of the fact that the absence of such common lands stands in the way of rapid expansion of Compost production in villages, recommends to other Provincial and State Governments the adoption of similar legislation". (The text of the U.P. Act has been given in Compost Bulletin, Vol. I, No. 2, June 1948, p. 12).

# No. 4. Tree planting in villages—Appeal for August 15th observance as Tree-Planting Day and appointment of a sub-committee.

"It was decided that (i) an appeal should be issued to Provincial and State Governments to observe August 15th as a tree planting day and the Secretary was authorised to prepare the appeal in consultation with the Chairman; and (ii) that a Sub-Committee consisting of Messrs M. S. Randhawa, J. C. Kumarappa, G. B. Bakshi,

M. S. Sivaraman, Aryanayakam and C. N. Acharya (Convenor) (with powers to coopt) be appointed to examine the issues involved in the programme of tree planting in villages for fuel supply and prepare a workable scheme for the above purpose, which could serve to release cow-dung for manure preparation—the sub-committee to report by the end of October, 1948 ".

#### No. 5. Crops which could supply fuel, fodder as well as food.

"Available data and information and the views of Provinces and States in the matter may be first ascertained by issuing a circular letter on the subject".

#### No. 6. Legislation for preventing the burning of cow-dung for fuel.

"Before a Sub-Committee is formed for the purpose, it would be useful to collect all available information and the views of the Provincial and State Governments in the matter by issuing a questionnaire on the subject".

# No. 7. Basic data regarding the quantity of manure prepared in villages.

"This Committee wishes to draw the attention of Provincial and State Governments operating Village Compost Schemes to the absence of basic data required for evaluating the progress of the above schemes, with special reference to: (a) the average quantity if manure prepared in villages per head of adult cattle maintained (cows, bullocks and buffaloes above 2 years old); (b) the average proportion of cow-dung burnt for fuel and (c) the average analysis of village manure in respect of organic matter, nitrogen and phosphoric acid, and recommends to the Provincial and State Governments take immediate steps to obtain the above information from sample surveys laid out on a statistical basis".

#### No. 8. Researches on Compost.

The Committee accepted the Chairman's suggestion that the Compost Development Officer at the Centre should be given a Research Officer, who should, for the purpose of coordination and check of provincial research work, be provided with facilities for carrying out necessary investigations at the Indian Agricultural Research Institute. New Delhi.

## No. 9. Propaganda activities of the Committee.

"This Committee feels that intensive propaganda should be carried out for Compost in the urban and rural areas. For the purpose of providing necessary guidance to Provinces and States in the above matter, the Central Committee should prepare and stock copies of standard propaganda material, like technical and popular ramphlets and books, lantern slides, short films, posters, photographs,

texts for radio talks, ballads, songs, etc., which could be loaned out to Provinces for preparation of texts in local languages. This Committee is willing to undertake preparation of the above propaganda material, if the Government of India would place the necessary funds at its disposal ".

# No. 40. Compost Staff and Organization both at the Centre and in . the Provinces and States.

"This Committee is of the opinion that for the rapid and efficient execution of the Compost Programme, it is necessary that the Staff, both at the Centre and in the Provinces and States should be adequately strengthened and that Compost Development Committees should be formed in all such Provinces and States where similar committees or Boards do not exist, for the purpose of coordinating the activities of the different Government Departments and other organizations engaged in executing the Compost Programme".

# No. 11. Sub-Committee Report on conservation of village night-

The Sub-Committee's Report was accepted and the Committee directed that copies of the Report should be circulated to Provinces and States for necessary action. (The Report has already been published in Compost Bulletin, Vol. I, No. 1, Appendix C).

## No. 12. Compost teaching and demonstration in village schools.

"It was resolved that fuller report of the action taken in the matter in all Provinces and States should be collected and put up for consideration at the next meeting of the Committee. The Committee recommended that Compost teaching and demonstration should be introduced into all primary and secondary schools both in rural and urban areas and that the subject should be included in the curriculum für Sanitary Inspectors."

# No. 13. Provincial and State Reports—Special difficulties met with in certain areas.

- (i) "In view of the absence of barriers between the States and Provinces in the matter of food production and distribution, this Committee strongly recommended that Compost Schemes operating in Indian States should be eligible for financial help from the Government, at the same rate as is given to Provinces under the Grow More Food Programme."
- (ii) "The legislation recommended to Provinces and States under item No. (3) for expeditious requisitioning of land in villages for compost preparation should be amplified so as to cover also the

expeditions requisitioning of land in urban surroundings for the preparation of compest manure from urban refuse."

No. 14. Date and venue of next meeting of the Central Committee.

This matter was left to the Chairman's decision and choice.

## 3. Shrimati Mira Behn's observations on Compost Schemes.

Shrimati Mira Behn, who possesses a long record of rural uplift and compost work and is a member of the Central Manure (Compost) Development Committee, communicated to the Nagpur meeting of the above Committee a Note embodying her observations on the present working of Compost schemes in India. Since her observations would be of great interest to all persons concerned in executing the Compost programme, the full text of it is given below:—

"There is undoubtedly general improvement in compost consciousness. U.P., 'C.P., Orissa and Bombay have been contacting me with regard to far-reaching province-wide schemes. Madras has also reported to me the decision to impart lessons in practical composting in all schools and to start small demonstration pits in all village schools. I hope things are moving well in the other Provinces also, even though I have not heard about it.

"The U.P. drive is especially for cattle-dung composiand the C.P. and Bombay drives seem to be concentrating especially on village nightsoil compost. It would be good if the two kinds of compost are tackled side by side, as the same staff can deal with both.

"As a result of the experience so far gained, I see one or two weak points. With regard to the cattle-dung compost there is a danger of the drive turning into a pit-digging programme, without the necessary improvement in method and quality being achieved. If the villagers dump basketfuls of dung and armfuls of grassy rubbish into the new pits just as they used to do in their old pits, and if they do not make an effort to save all the dung which is left over from the fuel requirements, and all the rubbish which lies about in the villages, then we shall have gained practically nothing, however, many new pits we dig. In the U.P. scheme, a compost Supervisor is expected to cover 200 villages in a year. This might be possible if all he had to do was to give instructions for the digging of new pits, but if the is to teach the villagers

how to prepare proper compost, and instil into them the energy to gather up regularly all the available dung and rubbish, then he will not be able to cover satisfactorily more than about 5 villages in a year. It is no easy matter to change the anathy of generations! Yet that is just exactly what we have got to do. If compost is of first importance, as indeed, we have all agreed it is, then we should be prepared to employ a much larger staff on the job. And this staff has also got to have a fuller training. As I suggested above, the composting staff should be trained both in dung composting and village sanitation. The training centres should be in rural places where there are good facilities, i.e., a cattle farm or some Ashram where village sanitation workers are already operating. Sevagram and Gopuri (Wardha) should be approached for cooperating in the formation of a Provincial training centre in C.P. where efficient teachers should trained who could afterwards open smaller centres. in Pashulok we could have such a centre for U.P. Provinces should select suitable centres on these lines. each of these Provincial training head-quarters there should be also a bio-chemist for carrying on practical experiments.

"This brings me to the second weak point which I feel to be hampering our progress, namely that our bio-chemists lack familitarity with day-to-day village life. If they will come and live in the country-side, surrounded by cattle, fields and villagers, their science will become cent per cent applicaable to the needs of India's peasantry. Today the laboratory and the country-side are far apart. The country-side cannot go to the laboratory. So the laboratory must come to the country-side. Otherwise things will not improve as they should.

"Now as to the village sanitation drives. I am not yet convinced that the schemes for trench latrines on the Surgaon model will work successfully without a bhangi in attendance in each village. At Surgaon there must be many old and tried workers who can handle the situation easily. But can we find sufficient workers of that type all over the country to make this form of sanitation universal? The villagers themselves may in rare cases, where enlightened influence has been at work on them for some time, take to supervising the use of public latrines, but this is hardly likely to become wide spread, at least for a long time. In the meantime, I do not

think there is any harm in training Bhangis to look after these latrines. It will be a clean and easy job, which bhangi, with his perfect art in sweeping, can do much better than anyone else. At the same time it will increase his income. He can continue his usual work of cleaning the cowsheds of the well-to-do villagers, and other odd jobs, and at the same time give two hours a day (one hour in the morning and one in the evening) to putting the public trenchlatrines in proper trim. Some arrangement should be made by which he would obtain a bonus on the manure produced in the latrines. The Panchayat should be in charge. Somebody has to be trench-latrine attendant in each village. There is nothing dirty about the job, like carrying tins of night-soil on the head, and other such awful jobs as poor bhangis have to do in towns. Why should the bhangi not benefit by this permanent means of livelihood? He will do it so much better than the rest of us, and we can learn from him. paration of cattle-dung compost I find bhangis to be quick in learning and excellent in their practice. The village bhangis can be trained in both cattle-dung composting as well as latrine supervision. The Government would do well to train them systematically and employ them as teachers. method is developed successfully in the villages where there are bhangis, later on bhangis may be introduced into villages where there are not any at present, or others may learn from them how to do the work. This feeling of being an instructor would also help to remove the bhangi's feeling of inferiority.

- "The Madras scheme for introducing composting into the schools is important. In Sevagram, the Basic Education Centre has found that tremendous strides can be made in village sanitation through the medium of the children. My feeling is that each and every Province should have in their village schools both cattle-dung compost pits and trench latrines and urinals. Each village school should, at the same time, have a small plot of land for gardening, where the compost can be applied to the soil. The beauty of the full cycle of life, death, return to the soil and new life, can then be fully realized by the children.
- "With regard to village urinals, I may mention that the Pashulok urinal is so far proving very satisfactory. So long as the urine does not fall on the surrounding earth, or the wooden planks, but goes straight into the chopped grass, there is no smell at all. Of course it is essential that the good

Indian habit of squatting while urinating be practised, otherwise the whole urinal gets in a mess. I have not yet had the time or opportunity to get the contents of one of these grassurinals tested, but it is likely that the manure will be good. An easy way of getting suitable grass for these urinals is to put straw or dried grass on the cart-tracks. In a few day's time the wheels of the carts break it up into small pieces.

"I have started using grassy rubbish in the trench latrines here, and I find that if the faeces fall on grass and are then covered with a thin sprinkling of fine earth followed by a handful of grass so that the next lot of faeces will again fall on grass, and the process of covering be followed in like rotation, there is practically no smell. The slightly putrid smell of trench latrines, in which earth alone is used for covering, altogether disappears. This has been a pleasant surprise. In order to get suitable grassy rubbish for these latrines the same process can be followed as for the urinals, namely putting grass or straw down on the cart-tracks.

"I give below some interesting quotations on sanitation from the Vishnu Puran given in Hindi translation. The instructions given there for spreading grass or straw on the ground before passing stools made me think that there might be some special value about it, and therefore, I have arranged the order explained above for the covering of the trench latrings, which results in the faeces always falling on grass or straw, and at the same time being covered directly afterwards with a double layer of earth and grassy rubbish.

"जितनी दूर बाण जा सकता है उस से श्रागे बढ़ कर मूत्र त्याग करे। पा आपमे निवास स्थान से दूर जा कर मल मूत्र त्याग करना चाहिये । पैर घोषा हुआ और जूठा जल अपने घर के आंमन में न डाले॥ ६॥ जोते हुए खेल में, सस्य सम्पन्न भूमि में, गौआं के गोष्ठ में, जन समाज में, मार्ग के बीच में, नदी आदि तीथ स्थानों में, जल अववा अकाशय के कट पर और शमशान में भी कभी मल मूत्र का त्याग न करे॥ ११ १२ ॥ मल त्याग के समय पृथिवी को तिनकों से और सिर को वस्त्र से ढक ले नथा उस स्थान पर अधिक समय तक न रहे और न इन्छ बोने ही॥ १४ ॥ (विष्या पुराण गीका पैस, गोरखपुर, ग्यारहवां अध्याय, पुराण २२६)।"

## 4: The Tree Planting Campaign.

The Central Manure (Compost) Development Committee, at its meeting held at Naghur on the 5th—7th July 1948, went into the question of expediting tree planting in villages with a view to providing alternative fuel in place of cow-dung now being purnt largely in villages. A sub-committee was appointed to go into the matter fully so as to recommend workal le schemes to Provinces and states but in the meanwhile, the Committee was anxious that the present monsoon season should not be lost and requested the Chairman, the Hon. Stri Jairamelas Daulatram to issue an Appeal to Provincial and State Governments to observe the week beginning from 15th August 1948 as a Tree Planting week in as many villages as possible.

In accordance with the above request of the Committee, the Hon. Shri Jairamdasji issued the following Appeal:—

#### APPEAL.

"August 15th is drawing nigh. It will be the first anniversary of our attainment of political freedom. For the masses of India the year which has passed since this political freedom was achieved has witnessed hardly any change in their condition. They had built high hopes when freedom was wen, but its glow has not yet reached them. It will serve little purpose to comment on the causes which have been responsible for this. We must make a fresh effort to make the people in the distant villages feel that the country's new status is leading to a definite change in their economic and social condition.

"Big developmental schemes are in preparation or execution which will water fresh lands and spread electric power in new areas. These will have their economic consequences on the life of the people round about them. The fruits of these schemes will, however, take some time to ripen and their benefit will be local. Other schemes which will, affect the life of the people are also going through the process of preparation and implementation. But they are all bits of a big whole; each will mature in its own time and place. Their execution depends upon factors which operate very slowly.

One would wish the masses in the villages to do something themselves which would make for change in their economic condition. It is open to the village folk themselves to organise a big programme of action. I would not indicate all the L605Appi

items they could include. Being in some way responsible for advisory function in regard to agriculture. I can speak to the agricultural masses only about items for the celebration of the freedom day which are linked with agriculture. I wish it were organise all the agricultural producers of the country in a vast drive for launching on a programme of production which is both within their means and also rich in immediate results. The seasonal factor probably comes in the way of many items of work being taken uniformly all over the country in the middle of August. But one item has been suggested to me which it appears is well-timed for the middle of August and is of a nature which permits its being imple mented in every village in the country. I wish to put it before all who have influence over the agricultural population in the rural Experts have told us how in India the agriculturists waste vast quantities of organic manure the use of which can enough food to cover entire national food deficit and leave a surplus This traditional habit of wasting the farmyard gatherings and other sources of organic manure is forced on the people because they have no other sources for the fuel they need in their daily life. A solution of this difficulty has been found in what are called quick growing trees. While lending a pleasant appearance to village surroundings, the fieldbunds, the roadsides, and the railway line, these trees will supply to the neighbouring village population a handy substitute for fuel purposes in place of the fertilising cowdung and other farm manure which our soil is hungering for. We will have done double service to the country by following such a programme. It can become a factor for more production. The individual who thus saves organic manure for his field is a gainer because he reaps a richer harvest and so is the country because of the total increase in food-crops.

"I would therefore appeal to all who are in authority in the Provinces and States to take immediate steps to organise a systematic programme of planting quick growing trees suited to local conditions during the week beginning with the 15th August. It is a simple programme. It has no relation to town life. It would make little appeal to the urban mind. But it fits in with rural conditions. It touches the life of villagers. It affects the yield from their farm. It affects therefore national production. But the task is a huge one, covering as it does lakks of our villages, and can only be successfully accomplished by the active cooperation—nay, by the initiative of the villagers themselves. Village officials, village school-masters, and village students can play a special role in this matter by arranging

total programmes and giving a lead to the local people in the campaign of planting quick growing trees, saving organic manure to corich our fields and thereby helping the country in its plans for greater food production."

The response to the above Appeal has been quite satisfactory considering the shortness of time available for the Provinces and States to take necessary action in the matter. Detailed reports are awaited from Provincial and State Governments, but the following preliminary reports have already appeared in the news papers:—

The Governor-General of India (H. E. Shri C. Rajagopalachari) planted a mango-seedling in the grounds of the Theosophical Society, Adyar, during his recent visit to Madras. In Calcutta, the Governor of West Bengal planted a tree-seedling in Government House, Calcutta.

In Rajasthan, the Rajpramukh and all Ministers Rajasthan Government took part in the tree planting cam-Shri Mani Kyalal Verma, Prime Minister. performing the tree planting ceremony at Neemuch Hill (Udaipur) declared that "unless we took up this noble work of plantation in right earnest, our beautiful state might more and more turn into a desert ". He appealed to every Government servant to plant at least one tree. Nearly one lakh of trees were expected to be planted in Rajasthan alone during the above week. In Madhvabharat, the Premier, Shri V. S. Khode planted a sapling in the compound of Gandhi Hall, Indore, on Independence Day.

In Delhi Province, the tree planting week was organized on a big scale—thanks to the enthusiasm shown in the matter, by Mr. M. S. Randhawa, Deputy Commissioner, and one of the members of the Central Manure (Compost) Development Committee. Several thousands of tree seedlings were planted in the villages. A special function was held at Bhowana village on the 2nd July 1948, which was presided over by the Hon'ble Shri Jairamdas Daulatram, Minister for Food and Agriculture, who appealed to the villagers to prepare and organize their own plans for improving their agricultural efficiency and economic condition. Among others who took part in the Tree Planting campaign in Delhi Province were Raj Kumari Amrit Kaur, Minister for Health, Govt. of India. Sir Datar Singh (Vice-Chairman, Indian Council of Agricultural Research), Seth J. K. Birla, Mrs. Indira Gandhi, Sardar Gurbax Singh, Prof. Ranga, Mrs. Sucheta Kripalani, etc.

Tree Planting Campaigns were also organized on a big scale in Bombay, the United Provinces, Madras and the Central Provinces.

## 5. Compost Development Officer for C. P. and Berar.

The Central Provinces and Berar Government have sanctioned a Village Compost Scheme which will operate on a fairly big scale in the Province. They have also created a new post of Compost Development Officer in class I. Dr. K. G. Joshi, previously Provincial Biochemist, C.P. and Berar, has been appointed to the new post and has been placed in technical charge of the existing Town Refuse Composting Scheme, as well as the new Village Refuse Composting Scheme.

Since, under the conditions existing in India, the scope for increasing manure production is much greater in villages than in the urban areas, and the quality of manure produced in our villages is also poor, there is great and urgent need for all Provincial and State Governments to take immediate steps to remedy the above defects by putting into execution a comprehensive scheme for the improvement of village composting under the technical supervision of a Compost Development Officer.

It is advisable to keep the same officer in charge of technical control of both the urban and village Compost Schemes and also allied schemes like the utilization of sewage, slaughter house wastes, sludge, etc., since the scientific principles under-lying the agricultural utilization of the above materials are more or less the same. It would avoid overlapping of scientific effort and promote better coordination of work carried out under the different manurial schemes.

### 6. Manurial Value of Compost.

There is even now considerable difference of opinion among agricultural "scientists" and workers in India, regarding the manurial value of Compost and the role played by it in the soil. In the post-Liebig period (1880-1920), when fertilizers came to be manufactured on the large scale and gave spectacular results in the newly exploited areas of America, Australia and Africa, scientific opinion was heavily weighed in favour of fertilizers. Bulky organic manures like farm-vard manure and composts were considered to be more suppliers of humus to the soil than of plant

food nuturients. In fact, opinion went so far as to claim that no I fertility could be maintained at a high level permanently without the use of organic manure and with the help of chemicals alone.

During the next period of 1920-1930, as a result possibly of the experience gained in World-War I, when available chemicals were diverted to war requirements and very little was available to meet agricultural needs, attention was again paid to the development of organic resources through composting and this came to be recognized as an arrangement possessing definite "war-time" value. After the advent of Bir Albert Howard again into the Compost field and the strong propaganda drive which he carried out in all the continents of the world, particularly after 1930, public opinion has veered very strongly in favour of Compost and organic manures in preference to the use of chemicals. In fact chemicals are even accused of spoiling the land after a certain time.

From the scientific angle, the above opinions of individuals or groups of men-however eminent they may be count for little unless they are backed up by experimental pertinent to the question. The case for an active compost programme in India is strong on economic considerations, as has been so ably pointed out in the Addresses delivered at the Compost Conference held in Nagpur recently (pp. 1-6 ante). It is no use wasting crores of rupees in importing foodstuffs, etc., while we have enough of manurial resources within the country itself lying unexploited. This consideration alone is sufficient basis for giving first priority to the Compost Programme over others, but at the same time it would make our position stronger if all available data relating to the crop producing value of Compost manure (in this is also included village and cattleshed compost commonly known as farm, vard manure), could be systematically collected and studied. It would be useful to obtain further confirmatory data on the subject from field experiments laid out on proper statistical basis with different crops and in different parts country.

In connection with the recent visit of Dr. A. B. Steward to India in 1947 to report on the manurial requirements of Indian Soils, Dr. V. G. Panse and his co-workers of the Institute of Plant Industry, Indore prepared a useful summary

sef manufal trials carried out in India on wheat, millets, oil seeds and pulses. The data pertinent to the use of Compost and farm-yard manure have been extracted from the above Summary and shown separately in Appendix A of this Bulletin.

The main conclusions that emerge from the data presented in Appendix A are:—

- (1) Where the crop is irrigated or is grown in areas of sufficient rainfall (say above 40 in.), Compost and farmyard manure show a definite beneficial effect on crop yield. The increase obtained is of the order of 5—7 lbs. extra grain per lb. of nitrogen contained in the manure.
- (2) When the mamure is applied annually or in alternate years over a series of years to the same land, soil fertility is built up to a high level and crop yields increase steadily, ill they exceed those given by a combination of artificial fertilizers.
- (3) In areas of low rainfall (below 30 in.), the increase in crop yield obtained by application of manure becomes less and is of the order of 2-3 lbs. grain only per lb. of nitrogen contained in the manure.
- (4) Some crops like jowar respond more markedly to Compost and farmyard manure than others like wheat and cotton.

It is necessary that further confirmatory data should be brained by laying down experiments in different parts of the country and using village compost properly prepared (by conservation of cattle urine) so as to contain at least 2 per cent. nitrogen (on the dry basis). In the case of town compost, more trials should be conducted on vegetables, potatoes and garden crops for which the manure is largely used.

## 7. Next Meeting of the Central Manure (Compost) Development Committee.

It has been decided to hold the next meeting of the Central Manure (Compost) Development Committee at Jaipur in December next, along with the session of the Indian National Congress. Advantage will be taken of the presence of lakes of visitors on the occasion from all parts of India to hold a Compost Conference which would be addressed by eminent all-India leaders, and to hold a Compost Exhibition

and Practical Demonstration so as to popularize the Compost Programme. Full details of the programme would be supplied to members of the Central Manure (Compost) Develop ment Committee in due course. Members who have any suggestions to give in this matter are requested to communicate with the Secretary (Dr. C. N. Acharya).

### 8. Compost Statistics.

The latest statistics received from different areas showing the position of the Urban and Village Compost Schemes in those areas, are given in Appendix B.

#### APPENDIX A

## SUMMARY OF MANUAL TRIALS WITH COMPOST AND FARM-YARD MANURE.

(Data taken from the summary prepared by V. G. Panse, M. D. Dendawate and S. D. Bokil, Institute of Plant Industry, Indore) for Dr. A. B. Stewart's Report on Soil Fertility Investigations in India. 1947).

#### Section I. Wheat.

- (a) Black Soil Tract (Bombay, C. P., Hyderabad and Central India).
- (i) Irrigated wheat: An average response of 6.2 lb. wheat per lb. N. was observed to cattle-dung at various centres in C.P. and of 4.9 lb. grain per lb. N. to F.Y.M. at Powerkhera. August appeared to be the best time for applying F.Y.M. and is to be preferred to earlier application in June or to a later application in October. It was noticed that the rate of response to cattle dung showed a tendency to decrease, when the inherent productivity of land was higher.

In one trial at Indore, in which large quantities of nitrogen in different forms were compared, the following yields were obtained:

				Yield o	f wheat in l	b. per acre.		
**	N P	er acre.			F.Y.M.	Compost	Night Soil	Amonium Sulphate.
37 lb.			•		1422	1363	1348	1066
73 lb.	• •				1526	1526	1807	-1111
110 lb.		••			1532	1881	1837	1244

The results are interesting as showing that at the high level of nitrogen applied, nitrogen from organic sources proved more effective than ammonium sulphate.

(ii) Unirrigated wheat: Response to organic nitrogen was generally positive in the unirrigated trials. There was an average response of 3.9 lb. grain per lb. nitrogen to applications of FYM, ranging from 10 to 50 lb. nitrogen per acre and of 2.4 lb. grain per lb. nitrogen to box manure applied at the rate of 100 lb. nitrogen per acre. Urine earth at 50 lb. nitrogen per acre gave an average response of 2.6 lb. grain per lb. of nitrogen. From seven trials at Power-Khera, application of FYM in August appeared better than either in June or October, a result similar to that from irrigated

wheat. Response to farm compost was only 1.7 lb. grain per lb. of nitrogen. Cattle dung gave an average response of 4.9 lb. grain per lb. of nitrogen, which is of the same order as the response obtained in irrigated trials.

At Saugor, 15 lb. mixed nitrogen per acre, equally derived from FYM or Compost and ammonium sulphate gave an average response of 7.3 lb. grain per lb. of nitrogen, when the annual rainfall was 43.2 inches and a similar response was obtained at Khandwa to a mixture containing 50 lb. nitrogen as Compost and 20 lb. nitrogen as ammonium sulphate

#### (b) Gangetic allumum (Bihar and U.P.).

In the trials in the United Provinces, pouderette gave an average response of 4.3 lb. grain per lb. of nitrogen to applications ranging from 50 to 100 lb: nitrogen per aere. Other bulky organic manures gave the following responses:

	****		•		 	
		Manure	<b>,</b>		Notice ren 1b. per acro.	Response lb. grain pe lb. nitrogen.
F.Y M.	••	•			 60	3.6(12)*
Cattle dung					 115	1 6 (7)
('ompost				••	80	2.7 (5)
					 ,	1

<sup>\*</sup> Number of trials averaged.

#### (c) Indus alluvium (Punjab and Sind).

#### Unirrigated Wheat:

A comparison of green manuring, Farm Yard Manure and Compost as sources of nitrogen at Gurdaspur and Rawalpindi showed that on equal quantities of nitrogen, Farm Yard Manure was distinctly superior to the other two at Rawalpindi but not at Gurdaspur.

Station			F.Y.M.	Compost	Green Manure.	
Gurdsspur (50 lb. N. per acre)			2.3	2.4	1.9	
Rawalpindi (125 lb. N per acre)	••	••	5.5	1 · 2	1.6	

Khar (Acacia senegal) a local weed, was found more effective as composting material than sann hemp at Gurdaspur.

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#### Section II-Millets

#### (i) Unirrigated Jowar:

The trials carried out in Bombay Province gave the following average response of Farm Yard Manure on millets.

	Lb as F.Y.M. in nitrogen per acre.							Response lb. grain per lb. nitrogen.
10	•••		•••	••			•	9.0 (3)*
2030				••	• •			4.3 (12)
4050				•				4.0 (5)
100125	••	••				. •		2.2 (2)

Farm-yard manure produced much better results with jowar than with certain other crops, e.g., cotton or wheat.

Low Rainfall Tracts.

In three trials at Amreli in Kathiawar there was a response of only 1.5 lb. grain per lb. N. to F.Y.M. applied at the rate of 70 lb. nitrogen per acre, while at Dhulia in West Khandesh District, there was a slight depression in yield in one trial where FYM was added at 50 lb. nitrogen per acre. Both centres are characterised by a low rain-fall and such results are to be expected. Response to farm Compost was small at Indore and at Hiimayat Sagar it was found less effective than F.Y.M. for equal nitrogen content.

In one interesting series of trials on F.Y.M. at Dharwar, where jowar was grown in rotation with cotton for several years in two sets of adjoining plots, the following average results were obtained for seven years 1932-33 to 1938-39.

Tre	at men	t				Response lb. grain per lb.
Field manured every year at 15 lb. 1	V per a	acre	••			30.0
Field manured for jowar @ 25 lbs.	,,	••				17.2
Field manured for jowar @ 50 lbs.	,,		••	••	• •	18.5
Field manured for jowor @ 100 lbs.	,,			••	••	15.7
Field manured for jowar @ 150 lbs.	,,			••	• •	11.9

These results show how productivity can be increased by continuous use of F.Y.M. Even when FYM was applied every alternate year large increases in yield were obtained from applications upto 150 lb. nitrogen per acre, without a serious drop in the rate of increase with larger quantities of nitrogen.

Poudrette gave an average increase of 8.1 lb. grain per lb. nitrogen from an application of 50 lb. nitrogen per acre at Dharwar. The result indicates its superiority to F.Y.M. on an equal nitrogen basis. At Surat, however, poudrette caused a slight depression in yield in one trial. Town sweepings at 50 lb. nitrogen per acre also increased yield at the rate of 4.0 lb. grain per lb. nitrogen at Dharwar. Cattle manure tried at Nagpur gave response of the same order as FYM. At Nadiad in Gujrat, cattle dung gave a slightly better yield than urine-earth for an application of 75 lb. nitrogen per acre.

#### (ii) Irrigated Jowar.

The manurial trials on irrigated jowar carried out at the permanent manurial plots, Coimbatore, showed:—

	Response lb grain per lb. nitrogen.				
	poor land with out basal ma-	New Series on	fertile land		
		Without basal manure.	With basal manure.		
Cattle manure 50 lb N per acre .					
A	26.1	18-6	24.6		
Average viell of no manure plots in lb. per acre	385	1910	1748		

In the trials at Coimbatore and Palur, F.Y.M. and farm compost increased yield at the rate of 4.2 and 5.8 lb. grain per lb. of nitrogen, ranging from 50 to 80 lb. nitrogen per acre.

At Coimbatore in the permanent manurial plots the response obtained on ragi was as follows:—

	Response in lb. grain per lb. nitrogen.					
	Old series poor plots without basal	New series fert	ile plots.			
	manure.	Without basal manure.	With basal manure.			
Cattle manure at 50 lb. N per acre	14.9	17.1	19.5			
Average yield of no manure plots in lb. per acre	347	1502	1352			
	• ,					

#### MAIZE

A high average response of 29.1 lb. grain per lb. nitrogen was obtained by an application of pondrette at 30 lb. nitrogen per acre at Kanpur. In the same trials, sheep, cow, horse and pig dung applied at the rates of 70, 50, 60 and 65 lb. nitrogen per acre gave average responses of 12.2, 9.0, 8.7 and 8.6 lb. nitrogen per lb. of nitrogen. Sheep dung was clearly a more efficient form of nitrogen than the others.

In two trials at Lyallpur F.Y.M., applied at the rate of 50 lb. nitrogen per aere, gave an average increase in yield as high as a mixture of sodium nitrate, bone meal and potash.

In peninsular India, response to F.Y.M. was good, being 9.7 lb. grain per lb. of nitrogen for 100 lb. nitrogen and 5.3 lb. grain per lb. of nitrogen for 200 lb. nitrogen per acre. At Abhavi, in the Southern part of Bombay, there was an average response of 10.5 lb. grain per lb. N to applications of F.Y.M. at the rate of 50 to 75 lb. nitrogen per acre. Comparable data for poudrette at this centre gave an average response of 35.7 lb. grain per lb. of nitrogen. Sheep dung at 50 lb. nitrogen gave an increase of 12.8 lb. grain per lb. of nitrogen and was superior to F.Y.M.

#### APPENDIX B.

Statistics of Compost production and distribution in different areas.

Table I.—Urban Compost Scheme.

Provinces and States	Period for which latest statistics received.	No. of Cen- tres oper- ating.	Vol. of Compost prepared during the period. (2/3 basis)	Vol. of Compost sold during the period.	Total Vol. of Compost sold during the financial year from 1st April	Vol. of unsold Compost (old and new) in stock at the end of period.
a	ь	c		e	f	g
			(u. ft.	cu. ft.	cu. ft.	cu. ft.
1. Ajmer-Merwara	1-4-48 to 30-6-48	4	50,450	<b>36.</b> 700	36,700	4,37,020
2. West Bongal	Do.	25	1,07,050	97,350	97,350	3,22,865
3. Bihar	1-4-47 to 31-3-48	18	6,39,085	7,85,425	7,85,425	6,97,775
4. Bombay	1-4-47 to 31-3-48	50	35,67,600	21,62,400	21,62,400	••
5. Central Provinces & Berar.	1-4-48 to 30-6-48	75	6,59,000	2,40,150	2,40,150	22,08,860
6. Coehin	1-4-48 to 31-3-48	6	23,337	9,548	9,548	1,26,462
7. Delhi	1-1-48 to 31-3-48	. 4	••	86,530	2,72,350	••
8. Gwalior State	Do.	21	1,23,350	2,58,925	2,58,925	5,88,750
9. Madras	1-4-48 to 30-6-48	91	14,14,982	17,35,034	17,35,034	51,25,896
10. Mysore	1-1-48 to 31-3-48	82	3,48,910	1,92,310	1,92,310	15,03,160
11. Orissa	Do.	7	50,340	26,520	26,520	4,87,170
12. Travancore State	1-1-48 to 31-3-48	14	85,095	61,291	61,291	8,95,468
13. United Provinces	1-4-48 to 30-6-48	156	29,81,940	21,80,550	21,80,550	67,93,380

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Table II-Village Compost Scheme.

ame of the Province	Period for which latest statistics received.	No. of villages operating the scheme.	Total vol. of manure prepared during the period.	Vol. of manure put on land during the period.	Vol. of manure in stock at the end of the period.
a	ь	С	ď	е	f
			en. ft.	ou. ft.	cu. ft.
Assam	1-4-47 to 31-3-48	651	6,89,864	<b>5,53,3</b> 88	1,36,476
West Bengal	1-1-47 to 31-3-48	9,081	8,36,49	4,00,281	5,15,605
Bombay	1-4-47 to 31-3-48	1,200	35,1 <b>3,</b> 350	<b>3</b> 5, <b>1</b> 3, <b>3</b> 50	
Coorg	1-4-48 to 30-6-48	166	4,50,658	4,43,553	69,597
Madras	1-1-48 to 31-3-48	2,295	3,07,315	2,74,254	2,30,886
Orissa	1-4-47 to 31-3-48	866	11,83,700	11,83,700	
East Punjab	1-1-48 to 31-3-48	138	4,52,731	1,90,157	4,98,360
United Provinces-			••	••	
Cooperative Composting	1-1-48 to 31-3-48	4,277	81,07,810	81,07,810	
Individual Com- posting)	Do.	,,	141,68,532	141,68,532	••

## COMPOST BULLETIN

## (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

Issued by the Compost Davelopment Officer, Ministry of Agriculture, Government of India

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## COMPOST BULLETIN

## 1. Second All India (Compost) Conference at Jaipur.

The opportunity afforded by the presence of a large number of constructive workers at Jaipur in connection with the 55th Session of the Indian National Congress that was held at Jaipur in December 1948. was availed of to hold the Second Session of the all-India Compost Conference on December 16th. The Conference opened in the Town Hall, Jaipur City at 10-30 A.M. under the presidency of the Hon'ble Shri Jairamdas Daulatram, Food and Agriculture Minister to the Government of India.

The Hon'ble Shri Daulat Mal Bhandari, Minister for Development, Jaipur State, Chairman of the Reception Committee, in welcoming the delegates referred to the serious food position in the country and the food deficiency of Jaipur State and pointed out the urgent need for mobilizing all local manurial resources of the State available in the urban and rural areas for increasing crop production and for making the State self-contained in the matter of food. He thanked the Hon'ble Shri Jairamdes Daulatram for suggesting the holding of the present Conference at Jaipur which provided a good opportunity for devising measures needed to step up manure production in the State.

## SHRI JAIRAMDAS DAULATRAM'S PRESIDENTIAL ADDRESS.

The Hon'ble Shri Jairamdas Daulatiam said that we are at present celebrating in Jaipur the victory won in the battle for freedom, but we have not yet won the victory in the battle for food. The people of Jaipur should forget the old sense of isolation as citizens of Jaipur State and should feel the new consciousness of being citizens of India as a whole, since the good or bad fortunes affecting India are sure to affect the citizens of Jaipur as well, especially in the matter of food supply. The matter cannot be solved by the Central Government alone trying to obtain food from other Governments, but it can be solved only by the combined efforts of the people of the country.

Looking at the food position in India, it is assuming more serious proportion from year to year on account of the increasing population and the deficiency of cultivable area. The difficulty is accentuated by the immigration of refugees from Pakistan to India in very large numbers. There are also other difficulties such as the poor and hilly nature of certain tracts, the absence of sufficient rainfall etc; but our problem is to surmount these difficulties by utilizing other resources available locally for increasing food production. Otherwise, the political freedom we have won for our country will not bring economic improvement and happiness to the people.

The productive capacity of the soil is bound to become poorer from year to year unless we return to the soil what we take out of it. The best type of manure for maintaining soil fertility is Compost Manure. Chemical fertilisers, even though they may show temporary effect, cannot keep the soil in good condition. On this point, there is some difference of opinion and there is need for starting experiments in our Research Institutes for comparing the nutritive value of crops raised on organic manures as against chemicals. This is a problem of great insertance to the public since the mental efficiency and bodily health of our nation depend on the quality of food which we eat.

Increase of compost production in Jaipur State should be viewed not as a small matter of increasing crop production in the State but as a matter affecting the vitality of the people as a whole. He would therefore, urge that a special Committee may be formed for the purpose of increasing organic manure production in all the villages and towns in the state.

Sir V. T. Krishnam schari, Dewan of Jaipur State, mentioned that the primary duty before the country is to grow all the food it needed without depending on imports from foreign countries. If the people realise the above necessity it is not difficult to increase our crop production by ten million tons within the next four or five years. He referred to the village development work which has been started in Jaipur State two years ago, in which compost making has been given a prominent place. Under the desert conditions existing in Rajputana, where wind erosion leads to serious 10.33 of top soil, the application of compost plays an important part in preventing the soil from being carried away by the wind. Therefore, compost making is a matter of vital importance for the cultivators of Rajputana.

Shrimati Mira Behn, and Baba Raghav Das also spoke pointing out the primary importance of manure production for improving the economic condition of our villages by improving soil fertility and crop yields.

## FORMATION OF COMPOST DEVELOPMENT COMMITTEE FOR JAIPUR STATE

At this stage, the Hon'ble Shri Daulat Mal Bhandari announced the formation of a special Compost Development Committee for Jaipur State consisting of the heads of departments concerned in compost manufacture and distribution like Agriculture, Public Health, Local Self Government, Transport, Revenue etc., with the Hon'ble Minister for Development as Chairman and the Secretary to Development Department (Mr. R.N. Dey) as Secretary He also announced that a sum of rupees one lakh would be ear-marked for financing the schemes of manure preduction prepared by the Committee.

# 2. Second Meeting of the Central Manure (Compost) Development Committee.

The Second Meeting of the Central Manure (Compost) Development Committee was held at Jaipur in the Secretariat Library (Mahkma Khas) at 2-30 P.M. on 16th December 1948 and 9-30 A.M. on 17th December 1948 under the chairmanship of Shri K. L. Punjabi, Secretary to Agriculture Ministry, Government of India.

The Chairman mentioned that the most important problem now facing the country was one of increasing food product on and one sure method of obtaining the result was by increasing compost production. This matter would claim the highest priority and maximum support from the Central Government.

The Secretary (Dr. C. N. Acharya) in presenting his report for the half year ending 30th September 1948, urged that under the Town Refuse Composting Scheme the production should be raised from the present level of 600,000 tons per year to a level of 15,00,000 tons per year before 31st March 1950 and for this purpose targets of production should be fixed for each area and the Provincial or State Governments should be requested to prepare plans for reaching the above targets. Under the Village compost Scheme, it was necessary to obtain estimates of the present level of manure production per head of cattle in villages of each area by sample surveys carried out on a statistical basis, before definite targets for increased manure production could be fixed for each area. He urged that such sample surveys should be carried out and the results obtained before the Committee meets again in July 1949.

Shrimati Mira Behn pointed out that there should be proper co-ordination between the scientific aspects of compost

production and the field work of demonstrating to villagers the results of such scientific work; for this purpose, she urged that provinces should pay more attention to the scientific aspects such as the technique to be adopted and the best methods of using compost. Economic considerations of cost and labour involved should also be kept in view. Possibly, the best way of verifiying the soundness of the technical advice given would be to test how far it is adopted by Kisans on a routine basis over a big area.

Secondly, she urged that alongside the problem of utilizing cattle shed and farm refuse in the best manner possible equal attention should be paid to the problem of utilizing village night-soil and urine. In fact, the same staff could supervise the operation of both the Schemes.

If the programme of compost production is to achieve tangible results in a short time, it is necessary that sufficient staff and funds should be provided for the purpose by both the Provincial and Central Governments.

- (i) Research Sub-Committee.—The Committee appointed a Research Sub-Committee consisting of Dr. B. N. Lal (U. P.), Dr. K. G. Joshi, (C. P.) Shri R. B. Gode (Bombay), Shri Madhok Patnaik (Orissa), and Dr. C. N. Acharya (New Delhi) with Dr. C. N. Acharya as convenor for the purpose of planning out, initiating and co-ordinating research work to be carried out by Provincial Governments and the Centre in relation to different aspects of compost production and utilization.
- (ii) Targets under the Town Refuse Composting Scheme.— Under the Urban Compost Scheme the Committee fixed tentative targets for different Provinces and States of the Indian Union for the half year starting from 1st October 1948. For the fulfilment of the targets fixed, the Committee felt that legislation was essential to compel municipalities to convert the whole of their refuse materials into compost. Municipalities should also be prohibited from selling night-soil to cultivators. Legislation was also necessary to give power to Government for expeditious requisitioning and taking immediate possession of land needed in urban surroundings for the establishment of Compost Depots. Difficulties of obtaining motor trucks and petrol supply were also mentioned by some members present.
- (iii) Village Compost Scheme.—As regards the Village Compost Scheme, the Committee recommended that the I. C. A. R. should be requested to link up their crop cutting

experiments by the random survey method with a scheme for obtaining the level of manure production per head of cattle in villages; and in addition Provinces and States should also be requested to collect the data from villages selected on a randomized basis. Based on the above data, targets for increased manure production in villages should be fixed for each area.

(iv) As regards the tree planting programme, the Committee recommended that the Provincial Compost Development Committees formed in different Provinces and States, and in their absence other Provincial bodies like the Agricultural Advisory Boards or Rural Development Boards should prepare comprehensive and detailed plans for tree planting for fuel in their areas to be executed during the next monsoon season (June-August 1949). The work should preferably be carried out through the Gaon Sabhas or Village Panchayats so as to reduce expenditure and ensure proper upkeep and after-care of the seedlings during the first two years of their planting.

In the present connection, attention is invited to an article on the growing of *Prosopies julifloria* (Vilayati Khejri) by Shri Khinva Raj Sankhala which is printed as Appendix A to the present issue of the Bulletin.

- (v) The Committee reiterated its former recommendation urging the need for forming Provincial Compost Development Committees in each Province and State so as to focus attention on and secure rapid expansion of Compost work in their respective areas. The resolution says "Since Compost Development requires immediate implementation and this needs detailed study of local difficulties, the Committee felt that there was justification for forming a separate Executive or Working Committee for the above purpose, other than the Rural Development or other Provincial Boards that may already exist in Provinces or States."
- (vi) The Committee drew the special attention of Provincial and State Governments to the need for proper utilization of sewage and sludge available in urban areas for increasing agricultural production especially of fodders grasses, fruit trees etc. and urged them to prepare comprehensive schemes for the purpose.
- (vii) The Committee is expected to hold its next half yearly metting in June or July 1949.

A detailed report of the proceedings of the Second All-India Compost Conference and Second Meeting of the Central Manure (Compost) Development Committee has been printed separately. Copies can be had from the Compost Development Officer, Ministry of Agriculture, Government of India, New Delhi.

#### 3. Compost Exhibition at Jaipur.

In connection with the meeting of the C. M. C. D. Committee, an all India Compost Exhibition was arranged in Gandhi Nagar, Jaipur from 14th December, 1948 to 22nd December, 1948 as an adjunct of the Sarvodaya Exhibition of the Indian National Congress. The Compost Exhibition was divided into two parts, one dealing with practical demonstrations of different methods of composting urban and rural refuse material including the Wardha System of trench latrines for villages, the Pashulok System for composting night-soil and urine, the improved method of farm-yard manure preparation by sectional filling of trenches, different methods of conserving cattle urine and general methods of composting recommended for village and farm refuse.

Large scale demonstrations for the composting of cow dung and litter available from the animals included in the All India cattle show proceeding in Sarvodaya Exhibition and the human wastes of the population living in the Exhibition grounds were also in operation on simple and hygienic lines which could be adopted in any colony or village, without creating nuisance of smell or fly breeding.

In addition to the above practical demonstrations, a large number of diagrams, photographs, charts, posters and pictures explaining different aspects of compost manufacture and utilization were exhibited in a tastefully decorated stall. exhibits represented the progress of the compost schemes in different parts of India and the importance of compost manure for maintaining soil fertility and improving crop-yields on a Special mention should be made in this permanent basis. connection of the excellent collection of diagrams, charts and pictures which were contributed to the compost stall by the The Honble Shri Jairamdas Daulatram, U. P. Government. Food and Agriculture Minister, who visited the compost section on December 18th, 1948, expressed his keen appreciation of the nature of the exhibits and their display. The Exhibition attracted a large number of visitors from 14th December, 1948 to 22nd December, 1948, estimated at more than a lakh in all. Considerable propaganda was carried out among the visitors by the distribution of large number of leaflets, pamphlets etc.

explaining the importance of the compost development programme for increasing food production and making the country self sufficient in the matter of food requirements:

### 4. Provincial Compost Development Committee for Madras

In accordance with the recommendation of the Central Manure (Compost) Development Committee held at Nagpur in July 1948, the Madras Government in their. G. O. No. Ms. 5262 dated 25th October, 1948 have constituted a provincial Compost Development Committee to plan and execute active measures for the development of compost production and distribution in the above Province. The Committee consists of the Hon'ble Minister for Agriculture (Chairman), the Director of Public Health, the Inspector of Municipal Councils and Local Boards, the Registrar of Co-operative Societies, the Director of Agriculture, the Secretary to Government, Development Department, the Provincial Motor Transport Controller, the Provincial Firka Development Officer, one Municipal Commissioner (representing municipalities), one agriculturist (non-official), and the Provincial Biochemist for Compost (if appointed) (Secretary).

The Committee will deal with both urban and rural Compost Schemes and will meet once in 3 months or "more frequently as may be required to formulate ways and means for the development and popularization of compost making in the Province and the proper utilization of the compost manure produced. The Committee will also be in charge of propaganda".

The Madras Government have also created a new post of Provincial Biochemist in the grade of a Deputy Director of Agriculture (G. O. No. Ms. 6221 dated 15th December, 1948). His duties have been defined as follows:—

- (i) To be in general charge of compost Development throughout the Province and to give advice on composting generally and, whenever necessary, to undertake actual training of the staff in Municipalities and major Panchayats where the compost scheme is operated;
- (ii) (a) To help the Municipalities and Panchayats to procure land for composting wherever necessary (b) to help in the actual sale of compost manufactured by the Municipal Councils and Panchayats. (c) to help the District Agricultural Officers and

the authorities of the Municipalities and local bodies by advice and actual demonstration in the making of rural compost from farm yard manure and waste vegetable matter; and

- (iii) to take active measures to extend compost manus facture to other municipalities and Panchayats and rural areas;
- (iv) To carry out such other duties relevant to the development of compost manufacture that may from time to time be assigned to him by the Government;
  - (v) to co-ordinate the activities of the municipalities, the Inspector of Municipal Councils and Local Boards, the Director of Public Health, the Registrar of Co-operative Societies etc. in regard to the production and distribution of compost.

### 5. Need for Provincial Compost Development Committees.

Provincial Compost Development Committees have now been constituted in C.P. & Berar, Madras Province and Jaipur State. The question has been raised in other Provinces whether the existing Provincial Advisory bodies like the Rural Development Boards, Agricultural Advisory Boards etc., cannot fulfil the functions of the Provincial Compost Development Committees, and whether the latter is not a redundant body which is likely to overlap the functions of the existing bodies.

The first all India Compost Conference and the subsequent meetings of the Central Manure (Compost) Development Committee have however expressed the view that there is strong justification for the formation of special committees for Compost Development. For one thing, the question of Compost Development is of immediate importance in view of the serious food shortage in the country at the present moment and there is need for examining the matter in great detail in relation to the conditions existing in different parts of the province and to work out the actual steps to be taken to overcome these existing Secondly, the Provincial Compost Development Committees correspond to Executive or Working Committees, since they consist of Secretaries and heads of Departments concerned in executing the compost programme. They work out the detailed action necessary from month to month or from quarter to quarter, and in this respect they differ from Provincial Advisory Boards or Rural Development Boards which cover a wide range of agricultural subjects in a general manner and make recommendations in broad outline.

Such an active programme of manure development as outlined above, is sure to rouse popular enthusiasm and ensure their active support in carrying out the compost programme. Compost Officers are aware that without the active support of the Gaon Sabhas and Village Panchayats it is impossible to achieve tangible results by way of increased manure production in villages or make much headway in the tree planting programme, which aims at the ultimate prevention of the burning of cow-dung for fuel.

It is therefore necessary that Provincial and State Governments should arrange for the constitution of active Provincial Compost Development Committees in their areas, as the first

step and a potent tool in securing the execution of an active programme of manure development in their areas.

### 6. Compost Meetings in Bombay and Calcutta.

A meeting of Compost Officers of Bombay Province was held in Bombay on 21st September 1948 at 10 a.m. in the office of the Central Cotton Committee, Ballard Estate, Bombay under the chairmanship of Sardar Datar Singh, Additional Secretary, Ministry of Agriculture, Government of India, Shri D. N. Mehta, Secretary to Bombay Government, Agriculture Department, Mr. Jabar Ali, Mr. B. N. Khurody, Milk Commissioner to Bombay Province, and the Compost Development Officers to Government of India and Bembay Province took part in the discussion. The meeting examined in detail the operation of the scheme for the distribution of 20,000 tons of cow-dung from the Bombay suburban area to agricultural centres in Thana, Surat and Kaira Districts and also the steps to be taken for securing expansion of compost production in the Bombay city area.

Two meetings of special importance were held in Calcutta relating to compost work in West Bengal—one on 26th September 1948 and the other on 29th September, 1948, both presided over by the Hon'ble Shri J. N. Panja, Minister for Agriculture, West Bengal. The first meeting was attended by the members of the Provincial Agricultural Advisory Board in addition to Strdar Datar Singh. Additional Secretary, Ministry of Agriculture, Government of India and Dr. C. N. Acharya, Compost Development Officer to Government of India.

After considerable discussion regarding the ways and means to be adopted for increasing compost production in West Bengal, the meeting recommended that action should be taken on the following specific proposals:—

(i) That Calcutta Corporation should undertake production of 10,000 tons of compost this year as a first step from their northern (Naupara) unsewered area; (ii) Howrah municipality should produce 10,000 tons of compost this year at their Belgachia Depot; (iii) the scheme for the distribution of sewage sludge from Bantola should be expanded and the expenses of transport minimised by extending the railway for transport of refuse and sludge from Dhapa to Bantola; (iv) Calcutta Corporation should make arrangements for separate collection of cattle dung

by the construction of special storage vats for the purpose in their Khatal areas; (v) the remaining municipalities in West Bengal should be persuaded to take up compost making and the difficulties met with in individual cases should be brought up for immediate action; (vi) the composting of water hyacinth should be encouraged by the award of special prizes and subsidies for the purpose; (viii) comparative trials of the manurial values of different types of organic manures should be initiated on Government and private farms in different parts of the Province.

The second meeting held on 29th October 1948 made a detailed examination of the proposals for expanding the Calcutta sludge distribution scheme by extension of the railway connection from Dhapa to Bantola.

### 7. Need for legislation under the Town Compost Scheme.

The Government of C. P. & Berar took the lead in August 1948, by way of an Ordinance and later by normal legislation, to secure power to Government to compel municipalities to compost their refuse materials before disposal or sale. As was brought to the notice of the C.M.C.D. Committee at its recent meeting held at Jaipur, there are large areas of the country where night-soil in it crude state is still being sold to cultivators as manure. In some areas, this is done directly by the municipalities concerned. In other cases, the sweepers have got a customary right to ownership over the night-soil which they collect from houses and this they sell, sometimes at high prices to cultivators. From the health point of view, the direct sale of raw night-soil to cultivators is open to serious objection, since there is danger of the spread of foecal borne diseases like typhoid, cholera, intestinal disorders, etc. from the towns concerned to the surrounding rural areas. The application of raw nightsoil to land is likely also to lead to spread of the infection of hookworm and to contaminate drinking water supplies on the farms concerned. In China, the great prevalence of hookworm and morbidity diseases is generally attributed to the widespread habit of applying raw night-soil to land.

It would therefore be evident that there is good justification for preventing by legislation the sale of uncomposted night-soil to cultivators either by municipalities or by sweepers concerned.

In the national interests of food production, however, it is essential that all urban wastes including katchra, night-soil, and sewage should be utilized, on hygienic and scientific lines, for increasing agricultural production. Towns depend for their food requirements on their surrounding agrricultural are as and as is well-known, the country side is getting poorer in fertility due to the failure of the towns to return their waste materials in the shape of manure to the surrounding agricultural lands. is therefore, enough, justification for initiating legislation to give power to Government to compel municipalities to convert their waste material into compost for sale to agriculturists. There is scope for preparing about 60 lakes tons per year of good quality compost from the municipal wastes in India, and this could increase our food production by 2 to 3 million tons per The C.M.C.D. Committee at its recent meeting held in fixed tentative targets of manure production for each Province and State for the years 1948-49 and 1949-50. view of the general apathy shown by municipalities in the matter however, it would be difficult for Provinces and States to fulfil the above targets of manure production (under the Town Compost Scheme) without the help of compulsory legislation. It is hoped that in view of the seriousness of the food position at present and its likely aggravation in future, along with the increasing population of the country, Provincial and State Governments would follow the lead of C. P. & Berar in framing necessary legislation in the matter. Alongside of the legislation for municipalities, it may also be necessary to frame rules for the speedy requisitioning of land in urban surroundings needed for establishing Compost Depots.

# 8. Assessment of the present level of manure production in villages.

Data collected from 75 villages selected in landom in Ajmer-Merwara in respect of the volume of manure prepared by the villages and applied to their land during 1947-48, and the number of cattle maintained by them, showed that there was a positive correlation (above 0.6) between the quantity of manure prepared in the villages and the number of cattle (cows, bullock and buffaloes of all ages including young ones) maintained by them. It was possible from the above data to estimate (a) the average amount of manure prepared per head of cattle (which came to about 45 cu ft.) and (b) the total quantity of manure prepared in the villages of Ajmer-Merwara from the total number

of cattle maintained therein. The above random survey therefore gives an idea of the present position of manure production in Ajmer-Merwara, which at a level of 45 cu ft. is much below the level of 100 cu. ft.-150 cu ft. per head of cattle obtained on Government farms and also on good private farms. From the random survey of 1948-49 it is possible to fix target levels of increased manure production for Ajmer-Merwara from year to year so as to reach an ultimate target level of 150 cu ft. per head of cattle after a few years. The actual achievement in each vear can be determined by similar random surveys carried out in relected villages each year. It is possible to raise the level of manure production from 45 ca. ft. per head of cattle to a level of 80-90 cu ft., by better collection of refuse materials from the villages and adjoining farms; but to raise the production to a level of 150 cu ft., per head of cattle, it is necessary not only to collect all available refuse in the villages and farms, but also to save the major portion of cow-dung now being burnt for fuel. This is possible only by initiating a systematic scheme of planting quick growing trees for fuel (like babul, Prosopis juliflora, Lenkania glanca etc.) from the present year.

The Central Manure (Compost) Development Committee at its recent meeting held in Jaipur recommended that all Provinces and States should similarly make surveys villages selected in random in each agricultural zone in their area so as to determine the present average level of manure production per head of cattle in those areas. Based on the above existing levels, suitable targets of increased manure production should be fixed for each of the above areas. sent proposals do not require any special staff or expenses, since the district staff already working in the Tahsils could be instructed to make surveys of the villages selected in random by the Department and asked to fill in forms giving (a) list of house holders; (b) number of cattle (bullocks, cows and buffaloes) maintai ed by them; (c) quantity of manure prepared in pits or heaps as determined by actual measurements. It is convenient to carry out the survey sometime in May, before the monsoon, so as to get reliable personal estimates of the total quartity of manure prepared.

It is hoped that provincial and State Governments would take early action to conduct such random surveys of their areas since without the above data it would be impossible to frame satisfactory plans for increasing manure production in villages.

### 9. The tree planting programme for 1949-50.

In August 1948 an Appeal for tree planting for fuel was issued by the Hon'ble Shri Jairamdas Daulatram, who urged that the Indpendence Day Celebrations should in rural areas go hand in hand with tree planting programmes. The tree planting coremonies that were conducted on August 15th in several parts of the country in response to the above Appeal were the cu'mination of a programme of tree planting that was in progress in the country during the monsoon period June-Aug. 1948. During the coming monsoon season of 1949, it is necessary that tree planting work should be carried out on a large scale on a systematic basis, so as to take full advantage of the early period of monsoon in June and July. Water supply and favourable soil conditions are the limiting factors for successful tree planting work and the above conditions are most favourable in June and July. Seedlings planted in June have the advantage of 2 to 3 months favourable conditions and such early planting may make all the difference between successful establishment of the seedlings in the soil or failure.

The C. M. C. D. Committee which considered the above matter at its recent meeting in Jaipur recommended that the Provincial Compost Development Committees and in their absence Rural Development or Agricultural Advisory Boards should from now on prepare detailed schemes for tree planting work in all the Districts of their area. The Committee recommended that in order to lessen the cost and ensure the successful aftercare and upbringing of the seedlings, it is necessary that the work should be carried out through the agency of Gaon Sabhas or Village Panchayats.

A detailed note on the subject of tree planting with special reference to the agro-sylvicultural conditions existing in C. P. & Berar appeared in Volume 1, No. 2, July 1948 issue of "Compost Bulletin." A further note by Shri Khinve Raj Sankhala of Jodhpur appearing in Appendix B of the present issue of the Bulletin recommending Prosopis juliflora as a drought resistant, quick growing fuel tree would be read with interest by our readers. This tree has the advantage that its leaves are not eaten by cattle or goats and hence it can be reared up with less protection than others with edible leaves. Further, the tree can be grown either from seeds or from seedlings (one year old). Prosopis juliflora appears to be doing well in different parts of India including the Delhi area. The

trees start suplying fuel (by loppings) within 4 to 5 years time and they can be grown in blocks which pan be out down in rotation after 5 or 6 years.

It would be useful to collect the information and data available on the subject of fuel plantations in different Provinces and States, with special reference to their economics. Short articles on the subject are invited from sylvicultural and horticultural experts in Provinces for publication in the Compost Bulletin.

#### 10. Panchayat Raj in U. P.

The need for the establishment of active village units in the form of Gaon Sabhas and Village Panchayats, so that they could take the initiative and responsibility for carrying out the "Make More Manure" and "Grow More Trees" campaigns in the rural areas, has been emphasized in recent issues of the Compost Bulletin We are glad to find that several of the Provinces are taking steps to strengthen their organization of Gaon Sabhas and Village Panchayats. C. P. & Berar, Bombay and Madras Province already possess a good system of Village Panchayats, but the United provinces have taken a lead in the matter by introducing legislation for a drastic reorganization of its village administrative system. The following account which appeared in the papers gives a picture of the village administration which the U. P. Government are aiming to achieve by their recent legislation:—

"Within ten weeks from now one of the greatest experiments in rural democracy and decentralization of power-an ideal much after Mahatma Gandhi's heart will be launched in this province through a system of panchayats and panchayat adalats (village courts).

"The U. P. has 1,10,000 villages with an aggregate population of 54 millions. The province will have, under the panchayat system 35,000 gaon sabhas (with an ultimate target of 50,000). The gaon sabhas will elect panchayats (executive), which will have 30 to 51 members according as the population varies from 1,000 to 4,000. The panchayats will have a total membership of 15,00,000—a huge democratic army trying to govern as well as teach people the art of government.

"This will in itself be a phenomenon, inasmuch as it will rouse the backward villager from his centuries old slumber and galvanize him into creative activity. This titanic experiment not only has a far reaching psychological

effect on the man of the misses but will also raise his social and economic standards—more so when implementation of the panchayat system is followed by the abolition of the Zamindari. The poor kotowing villager will be turned into a self-respecting and self-reliant citizen of the village republic. His petitioning mentality and mood of helplessness will give place to a realization of his own strength and his collective power in the affairs of his land. Minions of the law will no longer be able to hold him in their clutches, as gaon sabhas have been given power under the Panchayat Raj Act to report against any misbehaviour or default on the part of the public servant.

"In essence, every villager m in or woman above the age of 21—who automatically becomes life member of his miniature legislature, will come to possess the feeling that he is ruler of the small world around him. The Panchayat Raj Act is the Migna Charta of the 54 million villagers in the U. P.

"Formation of Gaon Sabhas.—Under the Act any village with a population of 1,000 or more can form a gaon sabha as well as absorb for this purpose small villages lying within a radius of three miles of it. Small villages, too, can form sabhas by joining together and thereby forming an individual entity. There will be no election for membership of the sabha because every adult ipso facto becomes its member, except lunatics, bankrupts serving sentences, convicted gamblers election offenders, honorary magistrates, Government or district board employees and those bound by law court for good conduct.

"Each gaon sabha will elect the president, vice president and members of the panchayat as well as five members to represent the sabha in the panchayat adalat, which will be a court of law common to four gaon sabhas. The features of the village elections will be joint electorates with reservation for minorities and scheduled castes, and voting by show of hands to avoid huge expenses. No candidate can stand for more than one office and in case of a tie, the decision will be made by a draw. The president and vice-president of the sabha will be ex-officio chairman and vice-chairman of the panchayat whose tenure will last for three years, one third of its members retiring voluntarily every year.

"The sabha is empowered to dismiss any member of the panchayat by a two-thirds majority vote. This establishes its sovereignty over its executive organ, the panchayat, which is to carry out the wishes of the majority in the sabha, on whose pleasure depends tenure of the panchas.

- "Generally, the sabha will have two sessions every years the Kharif meeting and the Rabi meeting. The Kharif meeting will discuss the budget. The sabha will be the final body on all taxation measures.
- "The judicial organ of the gaon sabhas will be the panchayat adalat. Each of the constituent sabhas will send to the adalat five Hindi-knowing representatives, whose term will be three years unless they are recalled by their sabha, Members of the Adalat will elect their chairman who will be known as sarpanch. The Panchayat Act envisages the formation of 8,000 adalats.
  - "The panchayat adalat will be a pleader-less court. There will be no appeal against its decisions unless grave micarriage of justice has taken place in which case, a munsif or a subdivisional magistrate can intervene. For cases falling within its competence no other court will have powers of hearing.
- "The Powers of Village Court.—The panchayat will not have powers of imprisonment, but it can impose fine up to Rs. 100, issue summons and warrants and, to prevent breach of the peace, demand personal bonds of good conduct for 15 days. It can hear civil, criminal and revenue cases within certain limits; it can decide suits involving litigation up to Rs. 500, hear cases of gambling and animal trespass and revenue cases involving sums up to Rs. 200 and can give judgement on thefts of articles up to the value of Rs. 50. The adalat will split itself into panels of five members to hear such cases, decision being taken by majority vote.
- "The panchayat system thus sets the villager in the first stage on the high road to democratic power both in the administrative and judicial fields, a power exercised by right of his citizenship of the village republic."—(Hindustan Times dated 22nd November 1948).

## 11. Expert Committee to report on Fertilizers and Organic Manures.

A great deal of attention has been focussed in the legislature and in the press on the use of chemical fertilisers and organic manures in India as means to improve crop production. In view of the divergent opinions expressed regarding the utility of chemical fertilizers in India and the need for further knowledge regarding the scientific application of fertilizers and organic

manuses by reference to crop-soil relationships; the Government of India have appointed an expert Committee consisting of the following members:—

- 1. Dr. J. N. Mukerjee, Director, Indian Agricultural Research Institute. (Chairman).
- 2. Dr. B. V. Nath, Director of Agriculture, United States of Rajasthan.
- 3. Mr. R. L. Sethi, Agricultural Commissioner, Indian Council of Agricultural Research.
- 4. Mr. C. S. D. Swamy, Deputy Agricultural Production Adviser (Fertilizers), Ministry of Agriculture.
- 5. Dr. C. N. Acharya, Compost Development Officer.
  Ministry of Agriculture.
- 6. Choudhary Mukhtar Singh.
- 7. Mr. H. C. Sharma, Deputy Secretary in charge of Grow More Food, Ministry of Agriculture, Member Secretary.

The terms of reference of the Committee have been specified as follows:—

- (i) to collect all the existing data relating to the use of Chemical Fertilizers and its effect on the soil.
- (ii) to go into the whole question of the value and advantages of using organic manures mainly compost.
- (iii) to take the evidence of the Central and Provincial Government Officers and practical agriculturists, wherever necessary.
- (iv) to suggest the best method of using chemical fertilizers either singly or in combination with organic manures with reference to the deficiencies in the soil in relation to the crop grown.
- (v) to examine the suitable forms of nitrogen for various soils and crops in India.
- (21) to review the work already done and to draw a programme for the future.
- (vii) to take such other steps as may be needed to achieve the objects of the Committee.

Since the Committee would be examining in detail the question of the manurial value of organic manures like farmyard manure and compost, and their effect on the Soil and Crop, Compost Officers and readers of this Bulletin, who have collected or could collect and submit data and information on the above subject, are requested to send the same as early as possible to

the Compost Development Officer; Ministry of Agriculture, Government of India, who will place the same before the Committee for their examination. It would be useful to have comparative data of crop yields from fields manured with farmyard manure and composts as compared to unmanured fields or fields treated with chemicals and other manures.

### 12. Compost Statistics.

The latest statistics received from different areas showing the position of the Urban and Village Compost Schemes in those areas, are given in Appendix B.

#### APPENDIX A.

#### PROSOPIS JULIFLORA (VILAYATI KHEJRI) IN MARWAR.

By Shri Khinve Raj Sankhala, Superintendent, Gardens & Zoo, Jodhpur.

(Extracted from "Jodhpur Information," Vol. 1, No. 5, dated 30-11-1948)

Marwar is the largest State in Rajputana with an area of 36,000 sq. miles. The greatest breadth is 170 miles, the greatest length being 320 miles from north-east to south-west. The territory comprises mostly Thar or the well-known Indian Desert. The desert is very poor in vegetation. Only a few plants can withstand the extremes of climate. The process of the extension of the desert is going on, and its enroachment on the adjoining territory. This is due to erosion of the soil and the shifting sand being blown up by the winds to form the sand depert. It has been found that the desert is advancing every year by half a mile, and if this continues, in due course the whole of North India would be covered with the depert. Even now stray sand dunes have been found near Agra in U.P. The problem of encroachment of the depert is of primary importance to Marwar because it adjoins the desert.

The climate of Marwar is very dry; the heat is intense and tiring. The scorching winds blow with great violence specially in April, May and June, when rand-storms are of frequent occurrence. The country is situated outside the regular course of both the south-west and northeast Monroons. The consequences are that the rainfall is scanty, irregular and uncertain. The average rainfall ranges between 10 to 20 inches............

Now the question arises of increasing vegetation. What species are well suited to these regions where rainfall is poor. Such plant must be one that grows quickly and is of some economic value. It should also be one that is protected from browsing animals by such means as spines prickle. After long experience it is found that *Prosopis juliflora* is the only plant which can be grown in this sandy tract, as a tree having many economical values which can be helpful in times of famine for fodder and fuel.

Prosopis has done equally well in Anglo-Egyptian Sudan, in areas of extremely low rainfall (4" to 8"). It was successfully introduced in dry regions of India, e.g., in Sindh, Baluchistan, and in parts of the Punjab. In Sindh it was introduced in 1878 from where it dispersed spontaneously over Miani plain near Hyderabad (Sind) through seed distribution by goats and sheep which eat pods. The species is best suited for desert plantation for checking the advancing sand of heavy sand storms, during the months of April, May and June. The sand dunes so formed are not only an ugly sight but are a great nuisance to the people when an ordinary wind blows from west, and carries the sand and drops it in the inhabited places, and also blows away the rich contents of the soil of the fields.

The leaves of this tree are not eaten by the cattle. So this is the plant which can give pleasant greenish tint in the yellow santy back ground and shade to the passerby, with many economical advantages from pode, timber, gum and fuel.

In the Punjab this has proved invaluable in clothing dry and bare hilly sides in localities with deficit rainfall. Its pods were analysed by the Animal Nutrition Section at Izatnagar and the observation was as under:—

			Crude Protein.	Ether Extract.	Fibre.	Nitrogen free Extract.
			%	%	%	%
Mexican Variety	••	• •	13.13	1.81	22.24	54 · <b>45</b>
Australian Variety	••	••	12-88	1.46	22·53	56.86

The tree is fast growing and it: timber is excessively hard and remarkably durable. It takes fine polish and is used for the keel of boats and for all purposes requiring strength and tenacity. Furniture is made of this wood (tables of different types, stools, nails, benches, bod legs, chaklotas, belan etc.). These are shown as exhibits in the Forest Office, Jodhpur.

At present we have prosopis juliflora of Australian form, which is best for sandy and other places and where there is scarcity of fedder.

In the year 1915 some seeds of prosopis juliflora were imported from Saharanpur by the Forest Department and propagated in the nurseries of Jhalra Farm where we now have the Willingdon Gardens. Some of the seeds were sent to the districts of Bali, Desuri, Jalore, Sojat and Jaitaran, where the experiments were successful. In Jodhpur City and its environments also this tree has thrived well.

It is unnecessary to go into the technical details of the study of this plant or its varieties or the high authorities holding excellent opinions about it as a protector of deserts, saviour of erosion and harbinger of rains, producer of soil fertility and prosperity to the rainless country. It is, however, worth while to say something about its economic value.

The tree gives good timber and fuel.

Its fruits are pods that are eaten by cattle as they have a sweet pulp. The tree yields fruits twice a year in summer and in winter.

There is an automatic propagation without much human effort, when once it has got established in the soil. The pods are eaten by the animal and seeds pass out and spread over on a progressive area. During rains the seeds germinate by themselves and most of them survive till the next rainfall. After two years the plant becomes independent of any care or watering. It then becomes a self supporting plant.

It is an evergreen tree which can grow even on the rocky hills, stormy furrows, and dunes and waste lands.

It is very hardy and requires little water. It can withstand a continuous chain of rainless years.

Its growth is very rapid and in about 30 years it attains the huge form of a tree. Other plants do not reach such stage in double the period.

In three or four years it begins to give pods relished by animals. Its leaves are not eaten by animals and hence it remains undisturbed and evergreen.

It is the best and cheapest kind of fuel tree. It gives fuel and char-

coal.

The more it is cut, the more it spreads out in branches. It can solve the acute shortage of fuel. The village people use at present the dung of animals as fuel instead of as manure. As this tree will give them fuel much valuable animals manure will be saved and the rural people will, be benefitted by enriching their soil.

Prosopis juliflora is best suited for desert; and sand dunes and checks the advancing sand. It fixes the sand. It gives a more beautiful complexion of greenish vegetation in the ugly and isolated sandy dunes.

It spreads out its shadow as an umbrella in the desert.

More vegetation means more attraction for rain.

Its timber is very hard, heavy and durable. It is used for making articles of furniture with strength and tenacity. Its timber competes Babul. It takes a very high polish and carving.

It is useful for making fences. It produces gum, which is edible and pleasant to taste. It is adhesive and its quality is as good as gum crabic.

It has proved to be an evergreen road-side avenue plant.

It is best suited for creating small shikar dense forest, where wi'd beasts can take shelter. It gives a good bush. Small germs get their food from the pods.

It gives a good screen to any height desirable. It serves as a hedge

round fields.

The percentage of germination of its seedlings is high and both sowing and transplanting operations are easy. However, the method of transplanting during rains just when the plant is already one year old, gives a high percentage of good result than cowing by broad-casting.

It grows on all sorts of soils. It does better than even babul a hardy

plant of the dosert.

Its growth is so rapid that 4 years plants go up to 12 ft. or 15 ft. height.

It is immune from insect attack when the tree becomes mature.

The heart-wood after proper seatoning is good timber for furniture and as good as shisham wood.

The plant having very long tap roots can take moisture early.

Seeds are to be sown in the month of February in earthen 'Nalias' and tran planted to their permanent places in the month of July i.e., beginning of the rains.

The plant easily established itself. In two years it becomes inde-

pendent of exterior help or water.

It grows well in depressions or trenches where sub-soil moisture

APPENDIX B.

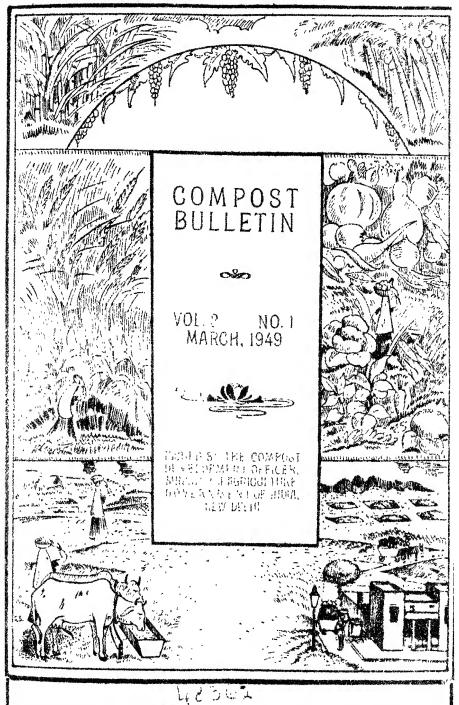
Statistics of Compost production and distribution in different areas.

TABLE I Urban Compost Scheme.

	<del></del>				1	
Provinces and States.	Period for which latest statistics received.	No. of Centres operating.	Vol. of Compost prepared during the period.	Vol. of Compost sold during the period.	Total Vol. of Compost sold during the financial year from 1st April.	Total Vol. of unsold compost (old and new) in stock at the end of the period.
a	. Р	c	d	e	f	g
1. Ajmer-Merwara	1-7-48 to 30-9-48	4	eu. ft. 44,950	cu. ft. 30,100	cu. ft.	eu. ft. 4,51,870
2. Baroda State	1-4-48 to 30-6-48	14	52,000	52,450	52,450	88,650
3. West Bengal	Do.	25	98,005	50,450	1,47,800	3,70,420
4. Bihar	Do.	20	1,87,171	117,830	9,03,255	6,52,647
5. Bombay	Do. •	64	19,80,080	220,570	9,30,479	47,50,570
6. C. P. & Berar	·Do.	87	4,48,850	32,150	2,72,300	25,89,910
7. Cochin	1-4-48 to 31-3-48	6	23,337	9,548	9,548	1,26,462
8. Delhi	1-7-48 to 30-9-48	. 4		35,460	358,880	
9. Gwalior State	Do.	, 24	1,33,125	2,450	58,125	7,73,950
10. Hyderabad State	1-1-48 to 30-6-48	35	35,110	1,12,527	112,527	4,53,037
11. Madras	1-7-48 to 30-9-48	90	14,25,241	14,54,106	31,50,430	48,86,009
12. Mysore	Do.	84	3,34,600	1,96,010	5,35,860	15,52,950
13. Orissa	Do.	. 8	36,260	11,500	24,720	1,41,050
14. E. Punjab	Do	12	13,665		10,000	2,85,445
15. Travaneore State	1-4-48 to 30-6-48	14	82,817	1,56,894	1.56,894	2,90,735
16. United Provinces	1-7-48 to 30-9-48	164	24.40,730	20,91,490	42,72,040	71,42,620

TABLE II—Village Compost Scheme.

Name of the Province.	Period for which latest statistics received.	No. of villages operating the scheme.	Total vol. of manure prepared during the period.	Vol. of manure put on land during the period.	Vol. of manure in stock at the end of the period.
а	6	r	d		f
•			cu. ft.	eu. ft.	en. ft.
1. Assor	1-4-47 to 31-8-48	651	6,89,864	5,53,388	1,36,476
2. West Bengal	1-7-48 to 30-9-48	7,577	5,66,219	7.04,449	4,46.399
3. Bombay	1-4-47 to 31-3-48	1,200	35,13,350	35,13,350	
4. Coorg	1-7-48 to 30-9-48	181	4,84,065	23,465	4,35,400
5. Madras	Do.	2,601	3,479	3,446	1,394
6. Orissa	Do.	1,290	16,14,360	2,98,960	17,14,770
7. East Punjab	Do.	326	5,26,244	8,16,987	3,90,426
8. United Provinces	1-4-48 to 30-6-48	1,377	1,59,65,908	1,06,31,511	53,34,397
			1	1	



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#### COMPOST BULLETIN

## (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

### Issued by the Compost Development Officer, Ministry of Agriculture, Government of India

VOL.	2	NO.	1		
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#### COMPOST BULLETIN

#### 1. The Deori Experiment in increasing Food Production.

The Adarsh Seva Sangh working at Pohri (Madhyabharat) has been doing useful construction work in the villages of Pohri-Jagir and has shown how by proper organization of indigenous resources and enthusiasm alone, food production can be increased by more than 100% in an area which was considered to be deficient in food. The Adarsh Seva Sangh concentrated their work in a group of 7 adjoining villages in the Pohri-Jagir, containing a total population of 1,117 souls and an area of 4,110 bighas under cultivation. When work was started in 1938-39, this unit of 7 villages was producing only about 4,019 mds. of foodstuffs (mainly wheat, jowar and mung) which at the rate of 1 lb. per head per day, was sufficient for only 68% of the population. By organizing the people into a Unit Panchayat, and fixing definite targets of increased production for each family, the Sangh was able to raise the total food production in 1947-48 to 8,138 mds., i.e., to more than double the previous production level. During the above period the total area under food crops increased only from 3,370 bighas to 3,462 bighas i.e., by about 3% but the average production per bigha increased from 1-1/5 md. per bigha to 2-1/3 mds. per bigha. The unit has now become not only self sufficient in its food requirements, but it has become a surplus area by about 20%.

It shows that by arousing enthusiasm in the villagers to produce more food, the country can be made self sufficient in the matter of food production in no time. Such enthusiasm can be aroused in the villagers by forming Gram Sabhas in each unit of 4 to 5 adjoining villages, somewhat on the model of U.P. Panchayat Raj and endowing such Gram Sabhas with powers to carry out the agricultural, industrial and social development of the unit, according to a three or five year plan, fixing targets for each year. The help required by the Gram Sabhas for executing their Development programme by way of technical assistance, materials and funds to the minimum extent absolutely essential would be provided by Government and in return the Gram Sabha would agree to execute the schemes under

the guidance of Government Staff and to hand over to Government its surplus production of food grains at rates fixed by Government from time to time.

The Deori experiment shows that even apart from the big schemes for irrigation, machinery and fertilizers which the Provincial and Central Governments are emberking on, extra production on a considerable scale could be obtained by utilizing local resources under the Deori Plan.

#### 2. Compost Conference at Patna.

Compost Conferences and meetings have been held at regular intervals in other provinces like Bombay, Central Provinces, and West Bengal, but the Compost drive in Bihar may be said to have begun with the Compost Conference that was held on 17-3-49, with the Hon'ble Dr. Syed Mahmud, Minister for Development in the chair. The Conference was attended by the Secretaries and Heads of different Government Departments like Revenue, Finance, Development, Lecal Self Government, Cooperative, Education, Public Heath, Agriculture, Veterinary and also by municipal representatives—Sir Datar Singh and Dr. C. N. Acharya attended on behalf of the Government of India.

The Conference being the first of its series in Bihar, went in great deal into the present position and scope for development of Compost work in Bihar. The Hon'ble Minister for Development in opening the proceedings outlined the steps already being taken by the Provincial Government for expanding Compost production from urban and rural wastes. Town Compost Scheme, the production is being raised to a level of 30,000 tons during 1949-50. Necessary legislation to modify the Municipal Act so as to empower Government to compel municipalities to convert their refuse into compost is being introduced during the current session of the Bihar Legislative Assembly. As regards the Village Compost Scheme, the Hon'ble Minister said that a province wide drive is being started almost immediately for popularizing the composting habit among the rural population. The success of the various efforts being made by the Provincial Government under their Grow More Food Compaign is shown by the fact that imports of foodgrains into Bihar from the other provinces had fallen down from 350,000 tons in 1946-47 to 175,000 tons last year

The target of extra production fixed for Bihar is 3,75,000 tons to be reached in 5 years' time. They had achieved an extra production of 50,000 tons during 1947-48 and 150,000 tons during 1948-49. At this rate Bihar would exceed its target limit in less than five years.

Sir Datar Singh who next addressed the Conference urged the formation of a Provincial (Compost) Development Committee, which could serve to coordinate the activities of different Departments concerned in executing the Compost Schemes and help to fulfil the targets of manure production fixed from year to **yea**r.

The Conference considered a number of subjects such as rural composting, eradication of water hyacinth, introduction of compost teaching in primary and middle schools, the programme of tree planting for fuel, the utilization of sewage and sludge for increasing agricultural production, formation of a Provincial Compost Development Committee etc.

The Honble Minister for Agriculture promised that his Government would take early action on the various subjects considered by the Conference—It is expected that as a result of the above Conference. Compost work in Bihar would get great impetus and make rapid headway in the immediate future.

#### 3. Present level of manure production in Ajmer-Merwara

Quite a good amount of Government money—both Provincial and Central—is being spent by way of subsidies, prizes, propaganda expenses etc. for stimulating increased manure production under the village compost scheme and it would be useful to have a satisfactory method of assessing the actual increase in manure production that takes place from year to year. The problem of assessing the increase in manure production under the Urban Compost Scheme is simpler since the quantity of urban refuse that was used as manure was negligible before the scheme was started in 1944 and hence the present annual production of about 750,000 tons under the above scheme may be said to represent a substantial new addition to the manurial resources of the country.

In the case of the Village Compost Scheme, however, there is, as to be expected, considerable over lapping between the old system of cattle yard manure preparation that has been in existence already in the villages and the new drive for compost production that has recently been started.

As is explained elsewhere in this Bulletin, considerable amount of cattle urine is at present being lost in the cattle sheds and this could best be absorbed and converted into a stable form by absorbing the urine in organic refuse and composting the two together. Since the villager with his limited resources cannot operate separate pits for his cowdung storage and for compost from cattle urine and other waste material available in the village e.g. leaf-falls, house sweepings, etc., it has been considered advisable to recommend to him a combined method which would include both storage of his cowdung, as well as composting of other material available in his village or on his farm. This combined method is known as the system of village composting, in which pits of suitable sizes are filled in sections with material soaked in urine according to the procedure described by the writer elsewhere\*.

It would be seen from the above that the system of village refuse composting now being popularized in the rural areas aims at (1) an increase in the quantity of manure prepared by collection and incorporation of extra refuse and (2) improvement in the quality of manure prepared by incorporating in the manure urine-socked refuse.

The output of work carried out under the Village Compost Drive, could therefore be measured (1) by the increase in total manure production taking place from year to year and (2) by the improvement in quality of the above manure brought about, with special reference to its nitrogen and phosphoric acid contents.

The recent survey carried out in Ajmer-Merwara by the random sample method taking 75 villages for examination. of which a statistical report (from Dr. P. V. Sukhatme, Statistical Adviser to the I.C.A.R.) is given in Appendix B of this Bulletin has revealed very interesting facts. For one thing, the data have shown that by the random sample method it is possible to form an estimate of the total quantity of manure produced in the whole Province by knowing the number of villages and the number of cattle maintained in them (cows, bullocks and buffaloes). Secondly, there is a high positive correlation

<sup>\*</sup> Indian Farming, May and December 1945, and July 1943 (Special Village Number)

between the number of cattle and the quantity of manure produced. This would help us to work out a factor showing the average volume of manure prepared per head of cattle—which factor may be used for (a) comparing the improvement in the level of manure production occurring in a province from year to year due to the operation of the compost schemes; (b) fixing definite targets of increased manure production for an individual or village or for the Province, and (3) also incidentally for fixing standards for the award of prizes, certificates, medal, etc., in order to stimulate increased production of manure. The present level of manure production in Ajmer Merwara averages about 45 to 46 cu. ft. per year per head of cattle

Since, however, local conditions are of a highly variable nature in different areas of the country, it is necessary that preliminary surveys by the random sample method should be carried out in a district in each separate agricultural zone, in order to work out the details of a statistical technique which could reduce sampling error to a low level (say below 2%). Special emphasis should be laid in this connection on the need for ensuring the accuracy of the primary data, if any useful or valid results are to be obtained by the Survey.

The months of April & May (before Monsoon) are most valuable for conducting the above preliminary surveys, since the bulk of the mai ure prepared during the year may remain in the villages and hence the error in estimating the quantity of manure prepared can be reduced to minimum by taking personal measurements on the spot.

It is, therefore, hoped that provincial and state governments would take early action in the matter, so that a fairly reliable estimate of the all India production of organic manure may be obtained.

## 4. Compost activities in Bombay Province.

A special meeting of departmental heads, municipal representations and the representatives of the Government of India was held in Bombay Secretariat on 7-2-49, presided over by the Hon. Minister for Agriculture, Bombay Province, which reviewed the progress made under the compost schemes in Bombay Province and outlined the steps to be taken for expanding manure production work in the above area. Bombay

is running a number of manure schemes, or e for the production and distribution of town refuse compost, another for the production and distribution of compost in villages, a third for the transport by railway of cowdung manure from the Bombay suburban area to the agricultural areas in Thana, Surat and Kaira Districts and a fourth for the conversion into compost of village night-soil. They are now planning to utilize the huge quantity of sewage now going to waste into the sea, for increasing crop production. Under the town compost scheme, legislation is being introduced in the Legislative Assembly to empower government to compel Municipalities to convert their urban refuse into manure. Bombay Province is now preparing about 150,000 tons of compost from town refuse, but the maximum potential scope is estimated at about seven lakhs tons per year. Introduction of enabling Legislation should help the Province to reach the above level in a few Bombay city alone, with its huge dumps of accumulated refuse at Chembur and Mahalaxmi can help to achieve the major portion of the above target, if railway transport is arranged for taking the manure to the vast areas under cultivation in Surat and Kaira districts. Ahmedabad and Poona can each add 100,000 tons of manure to increase the food production of the province.

Bombay Government are taking active steps to raise production not only under their urban compost scheme, but also under their village scheme. Since the production of rural compost overlaps to a considerable extent over the previously practised system of cattle yard manure preparation, the Bombay government are taking steps to assess the increase in the total manure production of the province, brought about as a result of the compost drive, by carrying out surveys by random sampling method.

A province vide drive for planting quick growing fuel trees was carried out in the monsoon of 1948 and it is proposed to repeat the work on a bigger scale during the monsoon season of 1949.

## 5. The tree planting campaign.

The tree planting for fuel compaign has gained wide publicity in India, thanks to the Appeal issued by the Hon. Shri Jairamdas Daulatram, Minister for Food & Agriculture,

Government of India, on the occasion of the freedom day celebrations on 15th August, 1948. Reports received from the major areas show that at a conservative estimate, over 520 lakhs of fuel tree seedlings were planted in response to the above appeal as shown below:—

Provi	nces & State	es.			No. of trees planted.
1. United P	rovinces ,		• •		7,59,000
2. Bombay					7,50,000
3. Madras				• •	3,00,000
4. East Pun	jab .				1,03,960
5. Central P		Berar			87,180
6. Baroda					10,000
7. Delhi				• •	59,000
		T	Cotal	• •	20,51,140

The Bombay Government gave a special stimulus to the scheme by offering prizes for the villages showing the maximum effort in the above direction. H. M.'s appeal was translated into practically all the local languages of the country and was broadcast to the village population over the radio, through the press, through special circulars to all village officials and by distribution of handbills in the local languages to the villagers.

In addition to intensive propaganda to stimulate local efforts, the Provincial Forest Departments have opened fuel plantations in selected blocks of land for the purpose of supplying fuel to villagers at concession rates. The extent of the fuel plantations that have been started during the years 1946-47 and 1947-48 are as follows:—

#### Bombay - -

Surat District			 342	acres
Sholapur District			 668	,,
<ul> <li>Satara District</li> </ul>			 402	,,,
Belgaum	• •	• •	 1247	,,
		Total	 2,659	,,
Madras Province			 20,261	,,
Punjab Province			 4,528	,,
Bengal Province			 700	,,
Coorg Province		• •	 23	,,

The Central Manure (Compost) Development Committee, which reviewed the position at its second meeting held at Jaipur in December, 1948, felt that in view of the great scope for expanding work in this direction, more strenuous attempts should be made during 1949-50, by spreading the tree planting work over the whole of the monsoon period from June—September, 1949; and for this purpose the work should be properly planned in each area and preferably operated through the Gaon Sabhas or Village Panchayats, so as to reduce expenditure and ensure proper upkeep and after-care of the seedlings planted.

Trials carried out in different provinces show that the following plants have given successful results from the point of view of rapid growth and fuel supply:—Prosopis juliflora (cf. Appendix A of Compost Bulletin, Volume I, No. 4, December, 1948); Acacia arabica (babul); Leukania glauca (in Madras); Casuarina (in Madras) and Cossia Sian ica (in Ajmer). It would be useful if the results of large scale fuel plantation work, comparing the economics of raising different types of fuel trees in the same area could be worked out, so that the cheapest method of raising fuel plantations in any locality, can be arrived at and adopted on the large scale.

#### 6. Compost work in West Bengal.

A special meeting of municipal and departmental representatives was held on 10th March 1949 under the chairmanship of the Hon'ble Shri J. N. Panja, Minister for Agriculture, Government of West Bengal.

The meeting paid special attention to the new schemes prepared by Calcutta Corporation for extending the railway line from Dhappa to Bantala at a cost of Rs.  $4\frac{1}{2}$  lakhs which would help to facilitate considerably the distribution of sludge manure from the Corporation Sewage Disposal Works at Bantala. It is expected that when the scheme is in operation, nearly 20,000 tons of sludge manure could be distributed each year. The Corporation has applied for a loan of Rs.  $4\frac{1}{2}$  lakhs from Government in order to complete their new project.

The Calcutta Corporation has also prepared a scheme at a cost of Rs. 5,200 for the construction of a number of compost vats in their Khatal areas, for the purpose of storage of cowdung manure. It is expected that the above vats would help to collect about 3,000—4,000 tons of manure per year, which at present is mostly burnt away as fuel.

The Howrah Municipality has put up a scheme for preparing 20,000 tons of compost from their municipal rubbish, by purchasing a fleet of 10 motor trucks for the above purpose at a cost of Rs. 1½ lakhs. They have applied for a loan from Government to enable them to purchase the above trucks.

13 other municipalities in West Bengal have also applied to Government for loans for purchase of motor trucks in order to enable them to increase their compost production. The matter was discussed at the meeting and the Agricultural Department promised to deal with the cases sympathetically in consultation with the L. S. G. Department.

Sir Datar recommended that the compost system should be extended to all municipalities in West Bengal (at present only 26 municipalities out of 80 are preparing compost) by introducing enabling legislation on the lines recently passed in C. P. and now being introduced in the Bombay Legislative Assembly.

Regarding the scheme for utilising Calcutta Sewage (130 million gallons per day) for increasing food production, it was urged that the Irrigation Department of West Bengal should make an early survey of the area round about Calcutta, with a view to selecting a suitable block of 10,000 to 20,000 acres for purpose of the above sewage irrigation. If necessary, the sewage effluent may be taken to a distance of 20 to 30 miles for the above purpose. The Irrigation Department promised to make a preliminary survey immediately.

In the above connection, it was also suggested that the Provincial Bio-chemist should be given an Extra Assistant to deal with schemes relating to the utilisation of sewage, sullage and sludge from the urban areas of the Province.

Sir Datar Singh also urged that the present level of manure production in the villages should be determined by the random sampling method and that experimental trials to determine the manurial value of compost should be carried out on a more extended basis, so as to obtain conclusive results as early as possible.

# 7. Composting in villages and cattle-yard manure preparation.

There appears to be a certain amount of misapprehension in regard to the relative significance of the terms farmyard manure, village compost and cow dung manure. The term farmyard manure in English usage refers to the manure prepared on farms, which consists of cattle dung, with a certain amount of cattle-shed litter and other wastes of the farm. In India, cattle are generally kept in the villages and the manure prepared consists mostly of dung with very little of waste litter and is generally known as "Gobar Kadh" or cow-dung manure. It is a misnomer to call cow-dung manure, prepared in Indian villages by the name of Farmyard Manure, since the former differs considerably in chemical composition from average farmyard manure prepared on English Farms. English Farmyard Manure contains from 2 to 2.5 per cent. nitrogen (on the dry basis), whereas cowdung manure prepared in Indian villages barely contains about 1% of nitrogen (on the dry basis).

The aim of the Village Compost Scheme is to collect and utilize refuse available on farms (e.g. crop residues, weeds, collections etc.) and in the village surroundings (e.g. leaf-fall, house sweepings etc.) and utilize the same for absorption of urine in the cattle-shed and subsequent composting with the dung available for manure preparation. By this method, a compost is obtained which is better in texture and richer in nitrogen than ordinary cowdung manure. Cowdung by itself decomposes only slowly, but when vegetable refuse soaked with cattle urine, or other nitrogenous starter is added, the development of micro-organic activity is very rapid and the whole mass gets rapidly decomposed into sweet-smelling humus. It is, therefore, claimed that by composting cow-dung, not only is a greater quantity of manure ultimately obtained, but also a product of better quality, richer in nitrogen.

The Village Compost Scheme, therefore aims at utilizing the existing stock of cow-dung in villages, as a starter for decomposing other vegetable and organic refuse materials. It makes the old primitive method of cow-dung manure preparation unnecessary in villages and substitutes in its place an improved method of compost preparation, which utilises not only cow-dung, but all other refuse that may become available to the villager in his village or on his farm.

There is therefore no justification for recommending to the villager the continuation of his old system of cow-dung manure preparation, alongside the new system of compost-making now being introduced in villages. In fact, the villager cannot afford the time or energy to run two systems at the same time.

All our energy should, therefore, be concentrated to secure the introduction of the compost system into his existing routine pits with the simplest possible modifications, so that very gently and without any visible disturbance he is led into the compost system. In fact, he must be made to feel that the compost system is nothing radically new but only a logical development and improved modification of his old procedure.

While this recommendation in favour of a single system of composting cowdung with other waste material is no doubt sound in the case of farms which have got cattle sheds on them or in villages where the cattle are kept, there may be exceptional cases of farms where the quantity of refuse available is so large e.g. sugarcane trash or forest leaves, that it cannot conveniently be carried to the cattle-shed either on the farm or in the adjoining villages. In such cases, we should recommend the opening of compost pits in the areas where such refuse is available in plenty, and convert the refuse into compost by the addition of a small quantity of cowdung slurry, earth or even chemical nitrogenous compounds. In view of the preponderantly large number of cattle in India (about 200 millions), the type of compost prepared on lines indicated above is bound to be small, compared to the system of composting cow-dung and urine with other refuse.

#### 8. Cochin comes into the Compost Programme.

Cochin has come into the lime-light in connection with its proposed merger with Travancore. Its enterprising Assistant Director of Public Health, Major P. Mohammad Ali, is a keen enthusiast of the compost system for the disposal of town wastes. In a recent report on the progress of compost work at Trichur he says:—

"The Municipality of Trichur which is a premier town in Cochin State adopted composting as early as 1935 when the State Department of Public Health demonstrated its practicability and usefulness. In the initial period the emphasis was more on the safe disposal of night-soil, rather than on its manurial value, which later on came into great prominence, as the "Grow more food" campaign gained momentum.

- "The practice originally followed was the open heap method. Nightsoil emulsion was applied to heaps of rubbish every week for about 5 to 7 weeks. Periodical raking and watering used to be carried out, which undoubtedly created a good deal of nuisance as well as fly breeding.
- "Towards the close of the year 1948, the Public Health Department of the State recommended the trench system of compost-making on the model advocated by Dr. Acharya of the Indian Council of Agricultural Research.
- "The trench system reduced fly breeding to the minimum. To make the entire procedure still more fly proof, pre-treated tarpaulin cloth of slightly bigger dimensions than the trench was used to cover up the trench from the 5th to the 12th day after filling up a trench. This was found to work admirably well in preventing fly breeding. No raking is done once a trench is closed.
- "A very great advantage noticed was the almost complete absence of nuisance. The entire area, when once trenches are filled appear quite tidy and without foul smell. A great impression is being made in minds of the lay public and prominent men visiting the composting ground."

Cochin Government have also recently appointed a Manure Officer for the purpose of increasing their production of manure from urban and rural resources. They have fixed the following targets of production under their urban compost scheme:—

Total for 1949-50		6,000 Tons
1st half of 1949-50 2nd half of 1949-50	· · · · · ·	2,000 Tons 4,000 Tons

## 9. Compost activities in Madras.

Madras Government have recently appointed a special officer for inquiring into the present position of urban compost work in their area and suggesting necessary measures for speeding up the same. A Special Conference of departmental

and municipal representatives was held in the Secretariat, Madras on 29-3-49 which was attended by the Hon'ble Minister for Agriculture, Madras Province and by Sir Datar Singh, and Dr. C. N. Acharya on behalf of the Government of India. The Conference considered the present position of compost and Sewage utilization schemes in Madras Province and recommended the preparation of new schemes which would step up compost production in urban areas to a level of 200,000 tons during 1949-50 and utilization of sewage for purpose of irrigation on the western side of Madras.

#### 10. Coorg Administration.

Coorg has fixed the following targets under the Village Compost Schemes:—

 1st October 1948 to 31st March 1949
 ... 37,000 Tons

 1st April 1949 to 30th September 1949
 ... 45,000 Tons

 1st October 1949 to 31st March 1950
 ... 68,000 Tons

#### 11. Compost Statistics.

The latest statistics of Compost production and distribution in different Provinces and States are given in Appendix C.

#### APPENDIX A.

TURNING FOOD DEFICIT AREAS INTO SURPLUS AREAS—AN EXAMPLE OF "DEORI" RURAL DEVELOPMENT CENTRE.

By Shri G. K. Puranik (President, Adarsh Seva Sangh, Pohri, Madyabharat).

In the course of my two meetings with the Food and Agriculture Minister of the Government of India, Shri Jairamdas Doulatram, he evinced keen interest in the work of rural reconstruction of the Adarsh Seva Sangha and particularly in that aspect of it which pertains to the increase of production of food. At his instance, a comparative Statement of progress of "Food Production" at Deori centre comprising 7 villages of Pohri (Madhya Bharat) was prepared and submitted to him for his information and use. In a period of 9 years between 1938-39 and 1947-48 covered by the comparative chart in question (appended herewith), the centre has registered an increase of 126% in the production of food in the area under its jurisdiction.

When this unit of villages was taken up for intensive "Production Drive" by the Sangha in the year 1938-39, it had a population of 1,117 souls; and the aggregate production of food commodities (cereals and pulses) in the area was 4,019 mds. At the rate of 1 lb. per head per day, this quantity could only satisfy the nutritional needs of 68% of the population and the area was short of food self sufficiency to the extent of 32%. By organised, systematic and intensive effort at production during these 9 years of experiment, the aggregate food production of the unit has come up to 8,138 mds. showing an additional increase of food by 4,119 mds. The unit has not only become self sufficient in its food requirements, but it can also lay claim to have become a surplus area by 141 mds. or 20%, over and above the requirements of its population. "Centre" has been maintaining systematic and regular records of agricultural production of every family in the unit for the last 10 years and more, showing how production has increased from year to year. On an average, the production in this area has increased by 14% every year. On the basis of the past experience, it may safely be said that with proper organisation and equipment and organised effort of the people, it should not be difficult to bring about yearly increase in agricultural production between 5 to 10% in a reasonably suitable agricultural area.

That an experiment of this nature should attract the attention and please the heart of the Food and Agriculture Minister of the Government of India is only natural. At his expressed desire that the experiment be given early publicity in "The Rural India" in the interest of providing inspiration and practical guidance to the workers in the cause of food production in the country, we take this opportunity of publishing it in the present issue in the interest of its wider utility. The Comparative Statement referred to above presents detailed study of increased production obtained at this centre in various agricultural commodities between the year 1938-39 and 1947-48 and also shows the increase of area under cultivation during the same period.

Comparative Agricultural Production Chart for the Year 1938-39 and 1947-48. Rural Reconstruction Centre—Deori (consisting of 7 villages), ADARSHA SEVA SANGHA, POHRI, MADHYA BHARAT. Population—1117 in 1938-39 and 1162 in 1947-48.

Serial			under ivation		Pro	Production in maunds			5	<b>D</b>	
No.	Item.	1938- 39A.D Sam- vat 1995	1947- 48 A.D Sam- vat 2004	Percent- ago in- crease		-39 <i>2</i> mva .995		D. S		vat	Percent age in- crease
1	2	3	4	5		6			7		8
	CEREALS	Big-	Big		Mds.	Sr.		. Mds.	-	(h.	
1	Wheat	. 1083	1130	5%	1,695	5 20	()	3,500	3 2	0	112%
$\frac{2}{3}$	1 30	. 1197 . 127	1278	7%	1,26/ 193	5 13 5 21	8	2,788 243	3 5 3 3 7		120% 26%
4	Paddy .	. 4	57	1325%	3.5	20	0	169	4	0	376%
5	Kutki, Kode Rala, Rali	'. } 60	85	42%,		12 15	0		25 16		125%
6	Barley .	. 28	28		77	30	0	132	23	0	70%
7	Bajra .	. 4		-	5	11	0	1	,		
	Total .	2503	2695	800	3,552	12	8	i 147	26	8	101%
	PULSES		!								i
8	Mung .	. 117	132	1300	20	26	8	511	26	0	2450%
Э	Urad .	. 149	259	74° <sub>0</sub>	31	27	8	134	6	0	76%
; )	Arhar .	. 109	245	$1290^{\prime}_{0}$	93	28	8	182	9	8	49%
11	Masoor .	24	31	$290_0^{\prime}$	17	24	8	21	<b>3</b> 0	0	18%
12	Gram .	. 468	100		303	8	8	141	2	8	••
	Total .	. 867	767	12% Less	466	35	8	990	34	4	112%
-	OTHER CROP	s									
13	Ground nuts .	. 158	149	••	775	15	8	979	35	0	26%
14	Gur	. 10	105	950%	38	15	0	1,938	10	0	5000%
15	Tilee .	268	485	81%	242	8	4	420	20	0	74%

Seria			under vation		l,	Production in maunds				
No.	Itom.	1938- 39 A-D Sam- Vat 1995	1947. 48A.D. Sam- vat 2004	Percentage in- crease	S	39A.D mvat 1995	).   1947-48   Sum   200	vat.	Percent- rge in- rease	
1	2		3	4	5		6	7		8
			Big- hrs	Big- hes		Ves.	Sr. Ch	. Mds. S	r. Ch.	
16	Alsi	•	139	129	209%	110	13 4	317 1	3 0	188%
17	Ajwain	• •	8	109	1263%	11	0 0	188 3	0 0	1618%
18	Mirch		20	10	• •	21	37 S	44 2	48	103%
13	Jira .		3.5	27		1	3 4	10 30	0 0	800%
20	Dhania		11	16	4600	<i>2</i> 3	10 8	33	8 0	43%
21	Menthi		0-8		••	1	5 0	:		
22	Cotton		Biswas 10	5		\$	25 8	3 1	1 S	
23	Sun, hemp		63	50		59	1 0	66 27	7 0	12%
24	Tobacco	••	17	1	••	44	22 0			
	Tota	1	739-8	1386	870.	1 336	26 12	4,004 0	0	200%
	GRAND TOTAL	L	4,1098	4848	18%	ə, <b>3</b> 56	4 12	12142 20	12	126%

#### NOTE :-

<sup>(1)</sup> The area under cultivation at the Centre has increased from 4110 bighas in 1938 39 to 4848 bighas in 1947-48 showing an increase of 18%; while the agricultural production during the same period has increased from 5356 mds. to 12142 mds., registering an increase of 126%.

<sup>(2)</sup> In the year 1938-39, the food requirements of 1117 population of the Centre was 5884 mds, whereas the production was only 4019 mds showing a clear deticit of 1865 mds, or 32% in making the area self-sufficient in food. Now, in the year 1947-48 the food production of the Centre is 8138 mds, which makes the area surplus by 1481 mds, or 20% after making full provision of the food and seed requirements of 1162 people at the rate of 11b, of food grains per day per head for consumption

Turning Food Deficit Areas into Surplus. -Increase in food and agricultural production is an important aspect of rural economy. There are other aspects showing increasing economic standard of the people of the area which are illustrated by the following table:—

Comparative Statement of Progress for the year 1938-39 and 1947-48 Rural Development Centre, Deori. (Adarsha Seva Sangha, Pohri, Madhya Bharat).

Serial No.	Item	1938-39 A.D. Samvat 1995	1947-48 A.D. Samvat 2004	Increase in 1947- 48 over 1938-39	Percentage of increase	Remarks.
1	Population	1117	1162	45	4%	The state of the s
2	Land under cultivation	4110 bighas.	4848 bighas.	738 bighas.	18%	
3	Agricultural production	5356 mds.	12142 mds.	6786 mds.	126%	
4	Self-sufficiency in food production	68%	120%			(20% surplus)
5	Total income	Rs. 13,221	Rs. 1,47,894	Rs. 1,34,673	1020%	More than
6	Average income per her head per annum	Rs. A. P. 11-12-3	Rs. A. P. 127 4 5	Rs. r. p 115 8 6	1020%	More than
7	Total debt	Rs. 16,197	Rs. 15,268	Rs. 929 less.	60'o .less	NOTE:— With 1020% of increase
8	Number of families free from debt	60	133	73	122°°	in the average income
9	Milk-yield	1809 mds	2316 mds.	507 mds.	28%	and thereby 11 times in- crease in the paying capacity of the people, the remaining volume of debt in pro- portion is almost in con- siderable.

It is significant that the total income of this unit, which was Rs. 13,221 in the year 1938-39 increased to Rs. 1,47,894 in the year 1947-48 showing more than 10 times increase in the average income of the people. The yearly income per head which was Rs. 11-12-3 in the beginning of our development programme, now stands at Rs. 127-4-5 which r cords remarkable improvement in the economic standard of the people.

The Technique.—Taken as a whole, this is mainly an agricultural In the prewar time, when this area was taken up for development, it was not a period of food-famine or scarcity anywhere in the country, more so in this particular part where food commodities were in plentiful Increased production of food could not have made a deeper appeal to the agricultural producers under the circumstances. course, the money-value of their produce was awfully poor and they could easily understand what rising standard of money-income meant to them. The Sangha, therefore, fixed an income target of Rs. 5 per head per month for this unit of villages, which had to be reached by stimulating planned and organised effort at increased production through gradual stages. This average income standard placed before the people, for organised effort and attainment was five times higher than their previous income and appeared to be a Utopia, beyond the villagers reach of imagination. Later on with the coming in of inflation this standard of average monthly income per head had to be increased from Rs. 5 to Rs. 30.

The formation and proper functioning of the Unit Panchayat and carrying out of its decisions, organised and planned drive, expert guidance intensive public education for increasing tandards of production and rising scale of income through regular and systematic records maintained for every family in the area, ever helpful and encouraging attitude of the master of the Jagir, Shrimant Shitole Sahib, and active and willing cooperation of the village people, contributed to the happy result of the experiment. With favourable conditions, the experiment is capable of producing similar results in different areas of the country and help in improving the present depressing food situation facing the country.

The New Programme.—Under changed conditions of food famine in the country, the Sangha has adopted a different technique in order to give vigorous push to the programme of food production in this area and has extended the scope of operation of this experiment to the area of 600 square miles of Pohri Jagir consisting of 220 villages, each unit having 4 villages within its jurisdiction. A trained worker is to be appointed to take charge of a Unit of villages. His business is to take complete agricultural census and survey of the area, fix up targets of production of every patch of land under cultivation, maintain records of production both potential and actual-of every agriculturist family, organise facilities for better and increased production on cooperative basis and progressively raise the standard of production by about 10% every year. There will be three Food Production Organisers for the area, who will be responsible for proper checking and supervision of the working of the scheme in an allotted number of units of villages. At the head of the working of the scheme will be a Director for Food Production who will be responsible for planning, general guidance, checking the progress from time to time and taking review of the progress of the cheme in the light of actual

results. A statistical department under a trained statistician forms an essential equipment of this new organisation, which will work under the Director of Food Production.

As per agricultural census taken by the Sangha in the year 1941, the population of this area of 220 villages, now taken up for "Food Production Drive" was 49,295 and the production of food was 1,94,986 mds. showing deficit of 26,841 mds. or 12% from the point of view of self-sufficiency. New census is being taken now to ascertain the latest food position of the area prior to launching the 'Production Drive'.

With sincerity of motive, trained and efficient guidance of the workers and responsive co-operation of the people this experiment is capable of being tried in any part of the country with more or less similar results. The country's food situation demands that we should have a net-work of such small scale food production experiments in all parts of the country which would help in converting most of our food deficit are, sinto surplus areas. (Reprinted from the Rural India, December 1948).

#### APPENDIX B.

A NOTE ON THE POSSIBILITY OF ESTIMATING BY SAMPLING THE TOTAL QUANTITY OF CATTLE YARD MANURE USED ON FIELDS IN A GIVEN AREA.

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- 1. This note gives the results of the statistical analysis carried out on the data relating to the number of cattle and the quantity of cattle yard manure used in the crop-year 1948-49, collected from each of 75 villages selected in the province of Ajmer-Merwara and examines the possibility of estimating by a sample survey the total quantity of cattle-yard manure put on the fields in a given tract.
- 2. The data wer collected by the Agricultural Officer, Ajmer-Merwara under directions from the Compost Deve'opment Officer, Ministry of Agriculture, Government of India. The villages included in the survey were taken haphazardly from the list of villages in the province and distributed as far as possbile evenly among the 16 store-keepers in charge of the Government Seed Depots and three agricultural assistants in charge of the three sub-divisions of the province. Although the villages were not selected by the principle of random sampling in the statistical sense of the term, it appears no extraneous considerations influenced their selection. The information was collected for each household in each of the 75 villages included in the survey. The method adopted in collecting the information was as follows:—

The store-keeper gave advance intimation to the village headman that he would visit the village on a particular day. Accordingly, on the date of the visit the heads of households were collected by the headman at one place and the proforma was filled in by the store-keeper (or agricultural assistant) by interrogating the cultivators in the presence of the headman. The presence of the headman and the neighbours was considered a sufficient guarantee for the accuracy of the information and for the complete enumeration of all the households in the village.

3. The village-wise information on the number of house-holds in each village, its cattle population and carts of cattleyard manure applied during the year is shown in appendix 1. The information is also summarised in table 1 which shows the two-way distribution for each of the 75 villages classified according to the number of cattle and the quantity of cattleyard manure used. It will be seen from the table that the more the number of cattle in a village, the more is generally the quantity of cattleyard manure used, indicating high association between the two characters. The table also gives the average quantity of cattle yard manure used per vil-

lage for each of the 13 class intervals into which the cattle population has been divided. The increasing trend of the average value of the quantity of cattle-yard manure used with the increase in the class intervals clearly brings out high correlation between the two characters.

- 4. The average quantity of the cattleyard manure applied pervillage works out to 963 cartloads. Assuming that the villages included in the survey were representative of the entire province, the simplest and the obvious estimate of the total quantity of the cattleyard manure applied in the province would be the product of this average with the total number of villages in the province. The number of villages in the province being 711, this works out to 684,949 cartloads.
- 5. Even granting that the sample was representative of the province, the estimate given above cannot be expected to tally with the true but unknown value of the total quantity of cattleyard manure applied in the province as a whole nor can it be expected to be idential with the estimates provided by other samples of the same size. Random sampling, however, makes it possible to work out what are known as the confidence limits which are expected to contain the true but unknown value with a given probability. Assuming the sample size to be fairly large as in this particular case, these confidence limits are given by plus or minus twice the sampling error of the estimated tot I quantity of cattle manure applied over the province. In this particular case the sampling error of the average quantity of the cattleyard manure per village works out to 87 cartloads and that for the estimate of the total quantity of cattleyard manure 61,807 cartloada. The confidence limits, therefore, come to 789 and 1,137 cartolads for the aver ge quantity per village and 5,71,335 and 8,18,563 cartloads for the total quantity for the province. The sampling error expressed as a percentage of the estimate works out to 9.0.
- 6. As the survey is intended to measure the increase in the quantity of cattleyard manure every year as a result of the compost Development scheme, it is essential that the total quantity should be estimated with a precision sufficiently high to detect the real increase. It is considered desirable that the total quantity of cattleyard manure should be estimated with a sampling error approaching 2 percent. For attaining this precision, a sample of about 500 villages will be required for Ajmer Merwara. It is, however, possible in the present case to secure an estimate of the same precision with a smaller sample by making use of the association observed above between the number of cattle and the quantity of cattleyard manure used.
- 7. This is done by the method known as the Regression Method. It consists in working out a linear relation between the quantity of cattleyard manure used and the number of cattle in a village and using it to obtain an estimate of the true value of the total quantity of cattleyard man-

ure for a province. The actual expression for the estimate comes out to be:—

 $Y_p$  : 711 [963·360 plus 0·793 ( $\bar{\mathbf{x}}_p$ -509·453)].

where Yp : the total estimated quantity of cattleyard manure in the pro-

vince in cart leads,

 $\vec{X}$  average number of adult eattle over 2 years per-village in the

province

0.793 : the regression coefficient of cattleyard manure wed per village

on its cattle population,

509.453 : the average number of cattle per virlage in the simple.

903.360 ; the average quantity in cartloads of cattleyard manuscused

per village in the sample,

and 711 : the total number of villages in the province,

The results of the analysis of variance are given in table II. It will be noted that this method presupposes a knowledge of the average number of cattle per village  $(\hat{x}_p)$  over 2 years in the population. Actually  $\hat{x}_p$  will not be known nor can it be easily estimated by extrapolation from the previous quinquennial livestock census reports since they do not give figures for cattle over 2 years. It is desirable that, in order to be able to use the regression method, the information about the number of cattle should correspond to the age classifications adopted for the live-stock census.

- 8. The advantage in adopting this method is the these mpling error of the estimated cattleyard manure is smaller than that of the estimate based on the average-per-village method. On the average, the sampling error of this estimate would work out to 1-r 2 times the sampling error of the latter estimate, where r is the correlation coefficient between the two characters. In the example under consideration the coefficient of correlation is found to be 0.643 thus in indicating that the sampling error of the estimated quantity of cattleyard manure using the regression method is approximately four-fifths of the sampling error by the average-per village method. In other works, the error of percent is reduced approximately to 7 percent or what comes to the same thing, a sample of only 420 villages in place of 500 would now be sufficient to obtain an estimate of the total quantity of cattleyard manure used in Ajmer Merwara with a sampling error approaching 2 percent.
- 9. The possibilities of yet another method known by the name of Ratio Method are also well worth investigating for the purpose of estimating the total quantity of cattleyard manure in a province. The method consists in calculating for the sample, the average quantity of cattleyard manure used per animal and multiplying the ratio by the total cattle population in the province. Though not as efficient as Regression Method, it has the advantage of simplicity in calculation. While presupposing the knowledge of total cattle population as in the case of Regression Method, it implies that the linear relationship between the cattleyard man-

ure and the number of cattle passes through the origin. The latter condition is not satisfied by the d tarelating to Ajmer-Merwara under consideration, as will by seen from the equation to the regression line given in the preceding paragraph. But it is possible that the condition elsowhere may be suitable for the application of the Ratio Method.

10. To summarise, the statistical analysis indicates that the method of random sampling using village as a unit of sampling and the regression method of estimation presents a possibility of estimating the total quantity of c: ttleyard manure with a sufficient precision. It is not however, recommended that a province-wide survey should be undertaken without further pilot investigation both as regards the size of sample and other technical details of sampling and practical difficulties involved in the field work, for the data collected in Ajmer-Merwara are not only meagre but were collected in a manner which provides little guidance on a number of other technical details of sampling. Even from the point of view of field work alone, it will be advisible to try the survey in a district or two before undertaking a province wide survey. in order to be able to test the suitability or otherwise of the questionnaire and the organis tion and supervision required for undertaking the work. Moreover, conditions v ry so much from one province to another that it may well he found that the results of the Ajmer-Merwara study are not exactly applicable in those places. The appropriate time for undertaking the field work, the population to be covered for a survey and the procedure of collecting information itself would also need prior investigation. It is, therefore, suggested that as a first step a pilot survey with the above objectives in view should be carried out in at least one or two districts in each province in about 150 villages selected by the method of random sampling.

Appendix 1—Abstract statement for the basic data under the Village Compost Scheme.

Serial No.	Name of village.		No. of house- holders	Total ca.tle population	Carts of manure pplied to fields during one year.	Vol of manure in cubic feet.	REMARKS	
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
1	Kakaraina		33	561	2,314	46,280	NOTE:-	
2	Jhabarkya		9	50	235	4,700	Averge capacity	
3	Rajosi		51	75	1,606	32,120	of a cart	
4	Manda		15	202	269	5,380	taken as 20 cubic	
5	Amli		22	312	294	5,880	feet.	
6	Barakhan		52	196	489	9,780		
7	Todgarh		94	229	471	9,429		
8	Khod mal		85	841	477	9,540		
9	Barakheda		109	231	380	7,600	; { }	
10	Banjari		70	227	447	8,940	)	
11	Govindgarh	!	203	679	1,056	21,120		
12	Bhagwanpura	1	65	350	761	15,220		
13	Kanas	• • •	73	301	475	9,500	} [	
14	Lesna		87	356	936	18,720	1	
15	Konwalia		72	420	838	16,760		
16	Jalia	.	391	2,013	4,174	83,480		
17	Kania		175	640	1,686	33,720		
18	Baral		143	734	966	19,320		
19	Sathana	1	169	742	1,584	31,680		
20	Shikrani		151	827	1,794	35,880		
21	Surajpura		61	298	195	0,900		
22	Saruina		59	213	159	3,180		
23	Kabra		76	477	324	6,480		
24	Devata		24	124	164	3,280		

(1)	(2)	(3)	(4)	(5)	(6)	(7)
25	Kalat Khera	17	98	134	2,680	
26	Gariawas	35	221	482	9,640	
27	Umtra	115	412	1,218	24,360	
28	Mohami	116	435	1,485	29,700	
29	Dani	54	331	1,350	27,000	
30	Sorana	65	325	897	17,940	
31	Bubani	. 94	408	1,549	30,930	
32	Chachiawass	91	535	1,300	26,000	
33	Mogri	64	346	1,978	39,580	
34	Sanod	183	1,316	2,506	50,120	
35	Mevdukala	35	1,364	1,926	38,520	
36	Dhawlia	3	24	65	1,300	
37	Kadora	35	1,566	2,331	46,620	
38	Chabaria	31	252	483	9,860	
39	Taswaria	. 32	472	778	15,560	
40	Kekri	. 183	4,898	2,393	47,860	
41	Manda		462	269	5,380	
42	Amlı	. ' 25	412	294	5,880	
43	Lachhipura	1:	74	142	2,840	
44	Morazari	55	2 272	515	10,300	
45	Deblia	29	270	500	10,000	
46	Soperda	10	791	1,182	23,640	•
47	Biala	4	3 168	201	4,020	
48	Jalia	4	8   181	983	19,660	1
49	Andheridevi	4	7   199	314	6,218	1
50	Gopalpur	3	3 201	568	11,360	į
51	Beawar	6	8 100	668	13,360	1
52	Sanwa	1	9 74	93	1,860	0 00 00 00 00 00 00 00 00 00 00 00 00 0
53	Gaddi Thorian	6	3 197	934	18,680	
54	Lasaria		5 258	316	6,329	,

(1)	(2)		(3)	(4)	(5)	(6)	(7)
55	Rajiawas		113	297	402	8,040	
56	Mandira		44	202	309	6,180	
57	Gonda		45	341	377	7,540	
58	Pipliya		24	134	175	3,500	
59	Tankwa <b>s</b>		43	345	400	8,000	
60	Kacharia		82	460	902	18,040	
61	Panohera		112	890	1,141	22.820	
62	Begliawas		84	901	1,439	28,780	
63	Rampura		23	364	553	11,060	
64	Shepuri	1	39	321	671	13,420	
65	Richmal		3	11	14	280	
66	Shyamgarh		205	553	1,397	27,940	
67	Somalpur	.	164	610	2,536	50,720	
68	Brikchiawas		130	391	2,115	40,300	
69	Arjunpu <b>r</b> a		71	251	916	18,320	
70	Karanas		45	98	835	16.700	
71	Daulatkhera		49	185	1,817	36,340	
72	Harmasa	••	231	1,802	2,367	47,340	
73	Tilonia		153	1,034	2,063	41,260	
74	Nayaganw		47	790	1,515	30,300	
75	Kesarpura		45	296	450	9,000	

TABLE I—Two-way frequency distribution of the number of villages selected in Ajmer-Merwara according to the Cattle population and the quantity of cattle-yard manure used.

	Quantity of Cattle Yard Manure used (Cart loads).														1
Number of Adult Cattle.	150	300	301 450	451 600	750	751 900		1051	í				i ove	Total.	Average quantity of cattle-yard manure used per village (cart loads
()—7ő	4	1				j	;		· . · ·					5	109-80
76-150	1	2		١	1	1	١.		!					5	395 - 20
151-225	1	3	2	, 3	٠.	٠.	. 2		٠.	!			1	11	593 - 18
226300	· .	1	. 5	4			i	١.		1		• • •		11	462 - 27
301375	;	; <b>t</b>	2	3	, 1	2	' i	•	1	1			1	12	764 - 08
376 - 450		1	ļ			1			1	1	1		1	6	1233 - 17
4 51525		1	1			1	1							4	568 - 25
.126600									1			1	į	3	1670 - 33
WL -875		١.	· .								. 1	ı	ì	2	2111-00
156 780							,	J		. ;		. !		3	1202 · 00
751 - 825								1			2	;		3	1434 33
326 900								,				1 :	}	2	1467 - 25
Above 900)										,			7	8	2399 - 88
fotal .	5	10	10	10	2	;		3	3	: ;	4	2	12	75	963 36

Table No. 11.

Analysis of variance of the cattle gard manure (cart-loads)

Source	e of variat	ton.	Ð.F.	. 8.8.	M.S.
Due to regression			1	19397489+81	19397489+81
Deviation from regression			73	2748379 - 47	370483+22
	Total		74	46880769+28	$_{\rm i}$ =633523+91

APPENDIX C
Statistics of Compost production and distribution in different areas
Urban Compost Schemes

Provinces and States.	Period for which latest statistics received	No. of Centres operating.	Vol. of compost prepared during period	Vol. of compost sold dur- ing the period	Total Vol. of com- post sold during the financial year from lst April.	Vol. of unsold
	ь	c	cu. ft. d	cu. ft.	cu. ft.	ou. ft.
1. Ajmer-Mer- wara.	1-10-1948 to 31-12-1948.	4	48,920	35,375	1,02,175	4,65,415
2. Baroda State	Do.	14	1.37.740	24,250	76,975	2,48,640
3. West Bengal	Do.	26	1,76,140	98,350	2.46,150	4,48,210
4. Bihar .	1-7-1948 to 30-9-1948.	19	1,87.171	1,17,830	4,04,139	3,78,999
5. Bombay	1-10-1948 to 31-12-1948.	73	11,23,950	3,24,300	12,40,439	56,50,100
6. C.P. & Berar	Do.	90	7,50,200	2,10,475	4,94,975	29,49,325
7. Cochin .	Do.	6	27,695	43,826	97,077	1,67,370
8. Delhi	1-7-1948 to 30-9-1948			35,460	3,58,880	• •
9. Gwalior State.	1-10-1948 to 31-12-1948.	24	1,53,275	55,275	1,30,450	8,70,600
10. Hyderabad State.	1-7-1948 to 30-9-1948.	35	26,303	4,950	1,53,477	4,38,340
11. Madras	1 9-1948 to 31-12-1948.	94	13,69,416	7,80,994	40,71,990	55,81,856
12. Mysore	1-7-1948 to 30-9-1948.	84	3,34,600	1,96,010	5,35,860	15,52,950
13. Orissa .	1-10-1948to 31-12-1948	s	49,960	11,370	36,090	1,79,640
14. E. Punjab	Do.	8	13,350	67,600	77,600	2,28,955
15. Travancore State.	1 4-1948 to 30-6-1948.	14	82,817	1,56,894	1,56,894	2,90,735
16. United Provinces.	1-10-1948 to 31-12 1948.	170	30,98,920	34,03,230	76,75,270	68,37,710

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# COMPOST BULLETIN

(A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

Issued by the Compost Development Officer, Ministry of Agriculture,

Government of India

VOL. 2 NO. 2			JUN	E, 1949
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This Bulletin is intended for the information of officers engaged in operating Compost Schemes, in order to keep them posted with the latest scientific and practical developments taking place in their field, in India and abroad. It must be understood, however, that the views expressed in this Bulletin are not binding on the Government of India.

#### COMPOST BULLETIN

# 1. Compost production in Costa Rica.

The Republic of Costa Rica in South America has an area of 23,000 square miles and a population of about 610,000. It grows coffee and banana in addition to general agricultural crops. Its enterprising President, who has become convinced of the need for returning to the soil all the urban and rural waste material available has passed a Decree on the 21st September 1948, setting up a State Corporation of Organic Manures for the purpose of composting all index, and rural waste material and utilizing at for maint during soil fertility. Senor Montealegre, who has been placed a charge of the above Corporation describes the new departure as likely to be the salvation of the country's agree altere and the well-being of her people'.

The text of the Costa Rica Decree would be read with interest by those in charge of Compost production work in this country:

TEXT OF THE DECREE

"The Founders Committee of the Second Republic, Costa Rica.

" CONSIDER: NO THE FOLLOWING E

- "That at the present time agriculture is squandering those animal and vegetable wastes which should go to the soil whence they came in order to enrich it and so give us healthier and more abundant crops.
- "That it is essential that the nation practice such agricultural methods as will enable it to utilise those sources of organic manure which are the basis of all sound agriculture.

HAVE RESOLVED

- 1. This present law requires that the manufacture of organic manures or compost from sewage wastes together with all usable forms of town wastes be considered as a matter of public concern.
- "2. For the purpose of manufacturing and distributing the organic manures referred to in the preceding Article, the "Organic Manures Corporation" has been set up, in the form

of a Committee consisting of five Government officials nominated by the Executive Power, as follows: three chosen from a rota of three names submitted respectively by the College of Agricultural Engineers, the Chamber of Agriculture and the Chamber of Industry, one nominated by the Minister of Public Health, and one member who shall be the Chief of the Section of Farming Research in the Ministry of Agriculture and Industry.

- "3. To procure the development advocated, the Organic Manures Corporation shall draw up plans and set up plants for the manufacturing of organic manures from urban residues where populations provide a sufficiency of suitable materials.
- "4. The Organic Manures Corporation has the authority to enter into such agreements as it finds expedient with municipal authorities, or with the Government if concerned, in order to establish the most suitable and desirable methods of waste collection and utilisation.
- "5. In order to implement this Decree, the Corporation is authorised to finance itself by means of a loan to the extent of 50,000 colones with State guarantee Profits acquired by the Corporation shall be applied to extending the radius of its activities.
- "6 The members of the Corporation shall be persons of known integrity, nationals or non-nationals, and shall hold office for four years, not being subject to removal during the period for which they were nominated. They will also have a knowledge of the manufacture of organic manure.
- "7. In order to achieve its ends the Corporation shall make use of the personnel of the Section of Farming Research, or, if this personnel prove insufficient, shall be authorised to appoint additional personnel remunerated from its own funds, to work under the direction of the Chief of the Section of Farming Research, who shall have the executive direction of the Corporation's project
- "8. In addition to the functions described in the preceding Article, the Section of Farming Research shall be authorised to initiate the utilisation of wastes in rural area, subject to the sanitary regulations issued by the Ministry of Public Health and the creation of Compost Clubs for farmers and school children, following the Howrah Method (the Indore Process).

- "9. The Corporation shall submit an annual budget of expenses and a plan of work to the Executive Power.
- "10. The Corporation shall within 30 days of its entering on office, submit a scheme for its own management to the Executive Power." (From the 'Farmer', England, Winter, 1948 number).

## 2. Pulverization of Town Refuse by machinery.

In the case of big cities, where thousands of tons of miscellaneous refuse are collected every day, and the night-soil usually goes into the sewers, the question of disposal of the collected town refuse often presents a problem. In the initial stages, the municipality manages to dump its refuse into adjoining low lying areas, but when the surrounding areas are all built up, the refuse has to be taken over long distances, sometimes 10 to 20 miles by railway, to find suitable dumping grounds. Since town refuse is fluffy and occupies considerable volume, the expenses of transport over a long distance could be minimised if the refuse could be pulverized by machinery before transport. The additional advantages of such pulverization are that the material becomes much less smelly and does not attract flies, rats or other pests.

The Metropolitan Borough of Southwark in London has been pulverizing its refuse before dumping it, for the last 44 years and hence its experience in this matter would be read with interest by those in charge of Urban Compost work:—

#### SOUTHWARK PROCESS

- "The Metropolitan Borough of Southwark, situated, as it is, in the very heart of London, and being a very closely built up and populated district, requires unusual methods for the disposal of its refuse. To install a refuse incinerator in the area would be out of the question for various reasons, and land is not available within the Borough (even if desired) for controlled tipping
- "The Council own extensive valley lands in Mid-Kent, which they have equipped as depots for the disposal of refuse. There is not, however, a super-abundance of soil (overlying the chalk subsoil) in the areas for 'covering off' purposes after tipping.

- "In 1905 the Borough Engineer (Mr. Arthur Harrison, M. Inst. C.E.) in collaboration with Messrs. Lightning Crusher Co. Ltd. (of 14a, Rosebery Avenue, London E.C.I.) closely investigated the possibilities of the treatment of house refuse by pulverisation, and in 1906 the Borough Council authorised the installation of two machines at Manor Place Depot. With certain modifications upon experience, these machines were found to be so satisfactory, that the number was later increased to six.
- "Two machines were replaced after 25 years wear and one machine after 28 years wear, the capital outlay upon the nine machines and buildings being £11,085
- "Refuse is delivered from the Refuse Collection Vehicles to the front of the machines. There are 3 men to each pair of machines, who, in process of feeding the crushers, throw out tins, iron, large rag: oilcloth, bottles, etc. The metal and other saleable materials are sold.
- "After passing through the crusners, the pulverised refuse falls on to conveyors discharging into railway trucks. This material is dispatched into the Country for the use of farmers on their land, and for covering off rough material deposited on the refuse tips. It may be stated here that all refuse deposited on the Council's tips is spread in layers of about 3 ft. depth and consolidated by tractors, leaving a good surface. free from any nuisance whatever.
- "The total area at Manor Place Depot occupied by the six machines, with conveyers, unloading and loading bays and buildings is only 385 Sq. yards, and the quantity of pulverised refuse produced per annum averages 20,000 Tons (or about 400 Tons per week).
- "The pulverising machine itself supplied by the Lightning Crusher Co., is of extremely simple construction, strongly made and may be described as "foolproof". It consists of a steel semi-casing with open box, fitted through the centre horizontally with a steel shaft, to which are mounted two heavy cast-steel discs which act as flywheels. Two 'U' shaped manganese steel hammers are slung upon powerful pins between the discs which, when the shaft is set in motion take a radial action in relation to it. A driving pulley is mounted at each end of the shaft, giving smooth running and even loading on their bearings.

- "The speed of revolution of the driving shaft actuated by a 50 B. H. P. electric motor (for each machine) is 1,200 revolutions per minute. The refuse entering through the feed-hopper is struck with terrific force by the rotating swinging hammers and disintegrated by trituration between the hammers and manganese steel grinding plate.
- "In the lower half of the casing a set of transverse parallel screen bars of manganese steel is fitted, between the spaces of which the pulverised refuse passes as soon as it has been reduced to the requisite fineness. These screen bars can be readily changed if it is desired to vary the fineness.
- "The refuse when pulverised is in the form of very fine mould which is innocuous, practically odourless and quite unattractive to flies, rats and other pests. It has some manurial value, especially for heavy soils. The reduction in bulk reduces transport costs
- "It will be observed that the foregoing notes refer only to the treatment of ordinary house refuse and do not include Trade, Market or Street Refuse Offal, Gully Slop, Infected Goods or discarded furniture, etc., for which other means must be adopted.
- The selection of any method of treatment and disposal of refuse, for an area, of course, must be governed by the situation, circumstances and requirements of that particular area, but it is hoped that these notes may be of some small service.

# 3. Food production on war emergency level.

Inaugurating the 25th session of the Bihar Cooperative Federation Congress at Patna on 10-4-49, the Hon'ble Shri Jairamdas Doulatram, Food and Agriculture Minister to the Government of India declared that just as war led to concentrated efforts to supply adequate ammunition and more than adequate food and cloth, and other necessaries for those who were on the battle front "so also we should deal with the problem of food on a level of war emergency, make a supreme effort to conserve, earmark and make easily available in the countryside all the requisites of agricultural production, namely, iron, steel, cement, coal, seeds, manure, etc, to enable the civilian soldiers to attain timely success on the nation's food-front".

The Honourable Minister said that agricultural production could be speedily solved only through democratic planning at the village level and by execution also at the village level. "The overall plan can be a tentative plan, but life, flesh and blood can be given to it only by adapting the plan on the village basis".

The best instrument for effective planning, he said, would be some kind of co-operative organization, which pooled the intellectual and material resources of the village population. Both the interest of the individual cultivator and of the nation as a whole, necessitated an immediate programme of maximum production. The un-coordinated efforts of millions of individuals and the wholly insufficient service which the State administration was at present able to render them would not achieve that end; rural organizations of multi-purposes character had to be as numerous as the organizations of State administrations.

"It would be a great thing achieved if the organization of multi-purpose, rural co-operative societies is given as much primary importance in the daily programme of provincial Governments as the maintenance of law and order or other basic duties of the State," Shri Jairamdas said.

Referring to the Government of India's decision not to import foodgrains after 1951, he felt that even without the necessary facilities and guidance, the peasantry of India could produce far more than the country needed. He pointed out that Japan produces three times as much rice per acre as India. If only we produce twice as much rice and wheat per acre, we, in India can maintain twice our present population.

"This can best be achieved through a network of cooperative organizations. The local Governments can play in this matter a determining role and help to create this type of machinery where it does not exist. This situation demands that organization of cooperatives in all our villages should become a front line item in the programme of every provincial and State Government".

The Hon'ble Shri Jairamdas said that without adequate procurement, increased production would not effectively meet the situation. In this field also co-operative organizations could play a great and useful role.

The Hon'ble Dr. Syed Mahmud, Development Minister, Bihar, in his presidential address to the Congress gave a three point programme of work for co-operative societies in Bihar to be completed in one year; first, every member of the cooperative societies should be made literate; secondly, in addition to the three lakhs compost pits, every member should make his own compost pit, and thirdly, each member should plant and preserve at least one quick growing tree and one fruit tree.

## 4. Cassia Siamica as a rapid growing fuel tree

References have already been made in previous issues of the usefulness of Acacia arabica, Prosopis juliflora, Leukani a Glauca and other plants for rapid growth under conditions of drought and supply of fuel within 5 or 6 years' time. Mr. Cazi (Rural India, April 1949) recommends Cassia Siamica as a drought resistant rapid growing plant suited for conditions in Saurashtra. It is specially valued for preventing soil erosion and for supply of fuel. Seeds of the plant (which may be obtained from the Chief Conservator of Forests, Mysore) are recommended to be planted 5 ft. apart on the ridges of trench bunds (trenches 2 ft. wide at surface, 1½ ft. wide at the bottom and 1½ft. deep the earth dug out to be heaped as a ridge on the lower side.

#### Mr. Cazi observes :-

- "Cassia Siamica is an ever green tree and is drought resistant par excellence. It does not throw shade capable of suppressing the field crop, especially when the tree is allowed to go straight up without much branching. Thick sowing at 5 ft. apart will make the plants go up straight.
- "After 4 or 5 years, the plants may be thinned and these thinnings will provide the first fuel to the cultivators from this source. Thinning is necessary to allow the holes to develop. Second and subsequent thinnings may be necessary, periodically, so that finally you should get a crop of tall straight plants 20 ft. apart. The wood of this tree is hard and besides being useful as fuel can be utilised for various purposes. The branches of the trees can be lightly lopped periodically and loppings used as fuel, until the tree is mature to be cut. Loppings will make the bole to develop better and at the same time reduce the B240Mof Agri.

area of shading. The tree after cutting regenerates by coppice and therefore once introduced by seed requires no further care or re-seeding. The tree grows very fast and being drought resistant can be grown on rain water only. It sheds leaves which add to the humus content of the soil below. Being leguminous, it carries nodules of nitrogen-fixing bacteria on its lateral roots, thus enriching the soil with nitrogenous manure. It bears beautiful flowers and is thus an ever-green ornamental tree."

The Chief Conservator of Forests, Mysore State, has given the following confirmatory evidence of the usefulness of Cassia Siamica:—

"The species Cassia Siamica has been raised in the State to meet the growing demand for fuel for several years. This species is quick growing, drought resistant and is not browsed. The fuel can be used in the green form and is popular. The species coppies very well and a 2nd or 3rd rotation may be obtained from coppies shoots. This comes up particularly well on red-loamy soil. The best results are obtained by sowing them on freshly dug mounds. Usual practice here is to dig trenches not less than 12 feet in length and sow fresh seeds on the mounds just after a good shower of rain. In one year they attain a height of 8 to 10 feet. They are found to do best in areas having an annual rainfall of 25 to 40 inches."

## 5. Scheme for Sewage utilization in India

The total quantity of sewage produced in India at about 40 centres fitted, though partially, with the sewerage system, is estimated at about 500 million gallons per day, containing total nitrogen equivalent to about 182 000 tons of ammonium sulphate per year, valued at over Rs. 5 crores. The importance of a proper utilization of this valuable material for increasing agricultural production of this country is therefore obvious. At present, it is estimated that less than 10% of the total quantity of sewage is being utilized for agricultural purposes.

The Sewage Farms which have been in successful operation for some decades past at Poona, Ahmedabad, Mysore, Madura, Hyderabad-Deccan, Delhi, etc., have shown that if the dose of sewage and rotation of crops be properly controlled, sewage effluent could be utilized for growing a variety of crops like

cereals, sugarcane, fodders, fruit trees, etc. yielding considerable profit both to the municipality and to the actual cultivator.

It is necessary therefore that Provincial and State Governments should examine the position of sewage utilization in their respective areas and should execute active schemes which would ensure that every gallon of valuable water in the effluent and every ounce of plant foodit contains, is fully utilized for increasing our agricultural production. It would be found convenient to coordinate this new line of development with the existing schemes for Compost preparation, by entrusting the work of sewage utilization to the Provincial Biochemist (or Compost Development Officer) and giving him suitable extra staff and funds to undertake the new work.

In order to give a lead to Provinces in the matter—and to provide the necessary technical help and guidance, the Ministry of Agriculture in the Government of India have recently engaged the services of Dr. R. P. Talati as Assisant Compost—Development Officer for sewage utilization work. Dr. Talati recently visited Madras and prepared schemes for utilizing about 25 million gallons of sewage per day after surveying the necessary sites. Other Provinces who require technical help in preparing their local schemes for sewage utilisation—may—write to the Government of India in the matter.

#### 6. Importance of Compost in Japanese Agriculture

Those who are familiar with King's "Farmers of Forty Centuries" know the important role which the preparation and use of Compost manure has played in maintaining soil fertility in China and Japan. But after the book was originally written about 40 years ago, Japan underwent vast industrial changes and one would have expected that she would have given up her old methods based on "organic" manuring and gone in violently for the use of modern methods, including the large scale use of machinery and artificial fertilizers. But the latest reports which have been received from that area indicate that Compost manure still plays the same important role in feeding the Japanese nation. It is estimated that nearly 81% of the total phosphoric acid and 93% of the total potash are supplied in the form of organic manures like Compost, farmyard manure, nightsoil,

green manures, etc. and the proportion of organic manure prepared has increased during the last 3 years after the cessation of the war.

In this connection, we would invite attention to an interesting article by Mr. B. R. Sen, formerly Secretary to Agriculture Ministry, reviewing the present agricultural production in Japan, printed in Appendix A to the present issue of the Bulletin. As a result of his personal observations in Japan, Mr. Sen remarks: "There is a good deal of loose and uninformed talk about the use of chemical fertilizers in Far Eastern countries. It is the view of scientists, especially those working in this region that organic manure must form the basic fertilizer for crops in the Far Eastern countries and that chemical fertilizers should be used only for top dressing".

## 7. Panchayat development in Bombay Province.

A Press Trust of India message from Bombay (dated 17-6-49) states.—"The Government of Bombay is taking steps to establish 'panchayats' in every village in the province with a population of 1,000 or above".

There will be about 5,000 'panchayats' in the province within two or three years. Even if the population is below 1,000 the Government will allow the establishment of panchayats provided 50 adult residents of the village ask for it.

The Hon'ble Shri G. D. Vartak, Minister for Local Self-government, said, "I hope to establish 1,000 panchayats by the end of 1949, raising the total to 2,500 later on.

"Out of more than 22,000 villages in the province, only about 1,400 villages had panchayats in 1946 when the present Ministry assumed office. Many of these panchayats had a nominal existence, he said.

Shri Vartak, who described the village 'Panchayat' as an "instrument of political education and an effective mode of decentralization towards the smallest unit of an autonomous

government", said in the year 1948-49 provision for Rs. 1,424 800 was made as allotments to village 'panchayats'. This was out of a total land revenue from villages of Rs. 45 lakhs.

In September 1947 the Ministry undertook legislation marking a "far-reaching" change in the Government's policy. The important change made was that every 'panchayat' would receive from the Government, as of right, 15 per cent of the land revenue collected in the villages. (Hindustan Times, dated 18-6-49).

# 8. Compost development in East Punjab and Himaehal Pradesh.

Compost production from urban and rural waste material had a set back in the East Punjab due to the aftermath of the partition. Things are now settling down and it is hoped that what has been lost in the past would be made up by increased activity in the future. The East Punjab Government have under their consideration the passing of an Ordinance to compel villagers to store their cowdung and litter in pits on proper lines.

The Compost Development Officer to the Government of India recently visited the above Province and after examination of the work now proceeding, submitted proposals for distributing an additional 70,000-80,000 tons extra manure now lying unutilized at Amritsar, Jullunder and Ludhiana Municipal Centres. The scheme involves the purchase and operation of a fleet of motor-trucks for distributing the existing stocks of manure.

Himachal Pradesh is a newly formed Union and contains vast potentialities for development. Proposals for developing rural and urban Compost work in the above area are now under consideration of Government.

# 9. Tree planting compaign in Madras Province

Fuller reports available of the tree planting campaign carried out in Madras Province during August 1948 show that the programme was carried out on a big scale. Nearly 15 lakhs of seedlings, cuttings and seeds were planted in the various districts of the Province. The following report prepared by the Director of Agriculture, Madras Province would be read with interest by other Provinces and States:—

"The "Tree Planting Week" was celebrated very successfully by all District Agricultural Officers and Officers in charge of Agricultural Stations, both in towns and villages throughout the Province, from 15th August 1948, in co-operation with the Revenue, Educational and Health authorities. It was a matter of great satisfaction to note that leading members of the public in every place also evinced a great deal of enthusiasm in the celebrations.

"Processions were taken out and meetings were held in a number of places throughout the Province. At all these meetings the public were told about the National importance of Tree Planting. The usefulness of trees as a source of green manure leaves and fuel and the need to prevent the waste of cowdung by burning was fully explained. The usefulness of shade which avenue trees accord on the road sides and in other places, besides their great utility as material for building purposes and for making agricultural implements were also emphasised. The ryots were also advised to plant quick growing trees and shrubs all along channel and tank bunds and on waste lands, stock yards and field margins, so that plenty of green leaf may be available for manuring their paddy lands.

"With a view to celebrating the "Tree Planting Week" a number of seedlings were raised in advance in special nurseries in the Agricultural Stations and in the compounds of Agricultural Depots, District Agricultural Offices and other Govt. Offices, wherever facilities existed. These seedlings and a large number of stumps of trees which can be propagated by cuttings obtained from all available sources were distributed to different centres where tree planting celebrations took place In addition, a number of seeds, seedlings and stumps were distributed to individual ryots for planting in their house compounds and field margins during the week.

"The total number of seedlings, stumps and seeds planted, distributed and sold by the officials of the Agricultural Department in the province during the Tree Planting Week in August 1948 is given below:

Seedlings	11,34,611
Stumps or cuttings	93,222
Seeds (Nos)	2,87,242
(Plus)	7,960½ lbs.

"The above quantities consist of the following varieties of useful trees and shrubs:—

Calatrop	pis	Poincia Elata	Scapnut
Adatho	da	Agatha	Gangaravi
Nerm		Gold Mohar	Chittikesari
Prosopi	Juliflora	Tatropha	Peepat
Rela		Erithrina Indica	Neredu
Lucaria	Glenos	Vodanarayana	Teakwood
Kapek		Madilaipuvaratu	Mecaranga
Nelalam	L.	Casia	Wild rubbe
Pungam	•	Kotakapalli	Red sand-r
Tamarir	ıa	Thangedu	Mulberry
Glyrace	dia Maculata	Divi Divi	Jaok
	Mango		Langast
	Lime		Pear
	Papaya		Apple
	Seetaphalam		Peach
	Grapevines		Strawberry
	Dorian		Plum
	Nutmeg		Plantain

Coconut

Cocso

Lituhi

Bread-fruit

Mangosteen

## 10. Manurial trials with Town Refuse Compost.

Experimental data relating to the crop-producing value of Town refuse compost is sparse in India and is scattered about in odd journals and reports. Recently, in connection with the work of the Expert Committee on Fertilizers and Organic Manures, an attempt was made to prepare a summary of the available information on the subject. Since this information would prove of interest to the Compost Officers in their drive to popularise the use of the manure among cultivators, a copy of the summary is included in Appendix B of this issue. above data would show that Town Refuse Compost possesses as good manurial value as farmyard manure and in some cases, even superior value, due to its higher phosphorus content. Before, however, an approximate relationship could be worked out between the dosage of town refuse compost applied and the average extra yield obtained of different major crops to which it is normally applied, it is necessary to have more systematic field trials carried out in different parts of the country and continued for a number of years.

# 11. Prosopis Juliflora for fuel supply.

The performance of Prosopis juliflora in Rajasthan has been described by Shri Khinve Raj Sankhala in an earlier issue of this Bulletin (Compost Bulletin, Vol. 1, No. 4, December 1948, Appendix A). We are giving below an extract from a report sent in by the Director of Agriculture, Madras, giving information regarding the habits of this fuel and fodder tree in Madras Province:—

- "Agricultural Research Station, Hagari.—The trial of Prosopis Juliflora plants was started on the Agricultural Research Station, Hagari, in 1933-34 with an idea of finding out its suitability as a hedge plant.
- "The land was prepared by working to guntaka twice and the seeds of Prosopis were sown in rows in the month of August. The germination was slow and in about a month's time most of the seeds had germinated. During the first year the progress of the seedlings were slow but, nevertheless, satisfactory. During the second year, the plants progressed well and by the third year the plants attained a height of about

5 to 6 feet. They started flowering during the third year and some pods were also formed. The branching of the plants were also profuse.

"The trees progressed slowly there-after and by about their 6th year they attained a height of about ten feet with wide branching.

The trees are now about 15 to 18 ft. in height with wide branching. They commence flowering in the month of January and pods mature about April-May.

- "The Forest Department, Madras, have planted Prosopis trees along the eastern bund of the Hagari River in 1941-42 or thereabouts, a distance of about thirty miles or so as a wind-belt and the plants are progressing quite well in the sandy soils under droughty conditions.
- "Central Farm, Coimbatore.—The following quantities of Prosopis pods were sown for fencing:—

1946			• •	10½ lb:.	In June, July and August.
1947				12 lbs.	In November.
1948	• •		•	205 lbs.	May to August.
1949	• •	• •		57 lbs.	May.

- "Germination and growth.—Germination was good when soaking rains were received following the sowing. In other cases, the germination was found poor. Once the plants have established, further attention was not found necessary. If soaking rains are not received after sowing and if they could not be watered, even sprouted plants have been found to dry up. Hence attention is necessary to keep up sufficient moisture for a period of about 1½ to 2 months following the sowing. This has been the experience with the sowing of pods. The sowing of seeds has not been tried.
- "Growing period.—During the growing period also if sufficient moisture is available, the growth is vigorous. Three to four lines of sowing gives a substantial fence having a good check against the trespass of human beings and cattle.

"Yield.—The trees grow to a height of upto 30 ft. There are well grown-up trees in the yard paddock and the following were the yields obtained from the paddock trees. The collections were made from the middle of April to the middle of July:

							<b>1</b> b.
1944		••	• •	• •	• • •	• •	315
1945	••		••	• •	••		170
1946	••	• •	• •				570
1947	••			• •			391
1948	••	• •			••		13
1949	• •	••	••	• •	• •	(incomp	45 lete)

#### 12. Compost production in different areas.

The latest statistics of Compost production and distribution received from different areas, under the urban and rural Compost Schemes, are given in Appendix C.

#### APPENDIX A

# AGRICULTURAL PRODUCTION IN JAPAN By

SHREE B. R. SEN (CHAIRMAN OF THE F. A. O.—E. C. A. F. E. WORK-ING PARTY ON AGRICULTURE)

Japan is the most highly industrialised country in Asia and at the same time her agriculture is also the most highly developed. The average yield per nectare for cereals crops in Japan in 1935—39 was the highest in the world. For some crops, it was more than double the average yield of the United States. The following figures for rice are quoted by Dr. W. H. Leonard of the Special Commissioner. Allied Powers

JAPAN

Year			Total acreage (1000 acres)	Total produc- tion (1000 Bushels)	Yield per acre	
1936	-			7.800	600,592	76 · 4
1940				7.790	542,613	69.7
5 year average		•		7,851	587,249	74.8
1941	••	••		7,799	491,037	63 · 0
1945	•		. '	7,399	383,993	51.8
ō year average				7,576	510,355	67.4

U. S. A.

Year				1	Total average (1000 acres)	Total produc- tion (1000 Bushels)	Yicki per acre
1936 .				•	981	49,820	50.8
1940					1,059	54,433	50.9
5 year av	rcrage				1,054	52.849	50.2
1941	••	••	٠.		1,214	51,323	42.3
1945					1,506	70,160	46.6
5 year a	v rage	••		••	1,422	63,307	44-8

The factors responsible for this yield are known to all, namely, assured supply of water for irrigation, use of improved strains of seeds

and scientific use of fertilisers. Japan provides an example to all countries in the Far East of how these factors can be put to the best advantage.

Irrigation and Research.—The total area under cultivation in Japan is distributed as follows:—

#### ACRES

	Year			Paddy Flds.	Upland Flds.	Total
1930			 ••	7,850,266	6,643,819	14,494,185
1935				7,887,349	6,956,569	14,843,945
1940				7,656,349	7,033,771	14,889,882
1945				7,317,604	5,779,001	13,096,605

Of this area 7.317,604 acres were reported in 1945 to be under irrigation in Japan, which unlike that in India is limited to the rice crop. The actual irrigated area is thus approximately equal to the area under paddy. In other words, almost the entire area under paddy is under irrigation.

The acreage covered by improved strains of seeds is stated to be nearly 100 per cent. The significance of this figure is realized when compared with the corresponding figures for India and China which are 5 per cent for rice in India, and 35 per cent for rice and 3 per cent for wheat, in China.

In the evolution of improved seeds and in the extensions of their use to the fields, two rg noies have played leading parts; (a) the Agricultural Experimental Stations and (b) The Extension Organizations including the Agricultural Co-operative Association.

In relation to area, Japan has one of the most extensive systems of agricultural research in the world. The main feature of these stations is that they are larger in number with independent responsibilities in dealing with localised problems. Wide deversity of climate is largely responsible for this feature. The following facts about the major crops, ice and wheat, are interesting:

Rice:—A large number of new varieties of rice adapted to particular regions and to special conditions have been produced by the Experiment Stations. Sixty per cent of the area under rice now grows improved varieties produced and distributed by them. Some of the early maturing varieties produced have made it possible to grow rice in almost all parts of the Hokkaido Island.

Wheat.—Until 1930, wheat was a minor crop in Japan. The fiveyear plan launched in 1934 resulted in a phenominal increase in its acreage and yield. One important contributory factor has been the early maturing and disease resistant varieties produced by the Experimental Stations. Sixty per cent of the total wheat area is now under improved seeds.

Increase of Yield.—The yield per unit area of rice, wheat, common barley, and naked barley has increased to 70 per cent, 140 per cent, 119 per cent and 62 per cent (using as a basis of comparison the averag<sup>3</sup> yields of the 5-year periods of 1876 -82 and 1938—42). The increase of yield for rice and wheat are all the more remarkable, when it is found that the acreage at the same time has increased by 25 per cent for rice, and for wheat by over 100 per cent.

The most remarkable feature in the Japanese agricultural economy is the way the results of research have been extended to the fields. The work in the past has been the Co-operative Association of farmers. The Agricultural Organization Law promulgated in 1948 converted these Co-operative Associations into bodies subject to governmental domination. Steps are now being taken to replace these associations by purely co-operative Associations based on principles recognized elsewhere in the world. The nature of the Experimental Stations dealing with localised problems also helps to establish a close working link between the Agricultural Associations and the Experimental Stations. The link is further strengthened by the Agricultural Technicians (one for each village or a group of small villages) who study the needs and problems of the Experimental Stations and at the same time help the farmers to test the results of research on their own fields and keep them abreast of research.

Fertilisers.—The fertiliser practices in Japan should also be the subject of special study by all countries in the Far East determined to pursue a progressive agricultural policy. Japanese agricultural scientists have conducted extensive investigations to improve fertilizer practices. Recommendations on the amounts and forms of nitrogenous, phosphatic and potassic plant foods to be applied to various crops have been passed on results of experiments conducted to determine the optimum amounts of fertilizers to be applied for the highest yields.

An important lesson which one learns is that farm manures have always been of great importance to the fertiliser programme of the Japanese farmer. Prior to 1926, before the Japanese farmers realised the value of commercial fertilisers, farm manures contributed a large proportion of the plant nutrients. From 1926 to 1940 though consumption of commercial nitrogenous fertilizers reached an all time high record in Japan, farm-manure still supplied as much as approximately one half of the nitrogen used; and as the tide of the war turned against Japan they became more important. During 1945, 86 per cent of the tetal nitrogen consumed was supplied by farm manures in one form or other.

In 1946, production of farm manures decreased slightly and supplied an estimated 81 per cent of all the nitrogen, consumed about two thirds of all the phosphorus applied and about 93 per cent of the potassium used on the farms. Farm manures have always been the major sources of potassium for Japanese farmers. In 1947 practically all the potassium (99.5 per cent) was supplied by farm manures.

Compost.—Among the various farm manures used by the Japanese farmer, compost is the most important source of plant foods. In 1916, it supplied 47 per cent of the total nitregen, 66 per cent of total phosphosic acid, and 64 per cent of the total potash applied to the soils of Japan. During the same year night-soil supplied 16 per cent, 8 per cent and 10 per cent respectively and other manures such as plant askes, sea-weed and animal excrements, supplied 14 per cent, 15 per cent and 16 per cent respectively of nitregen, phosphorus and potassium consumed in Japanese farms.

There is a good deal of loose and uninformed talk about the use of chemical fertilisers in Far Eastern countries. It is the view of science is, especially those working in this r good, that o genic manure round form the basic fertiliser for crops in the Far East rn countries and the cold again fertilisers should be used only for top dressing. The example of Japan which has the highest average yield of all countries in the world must not be ignored, especially in view of the present shortage of chemical fertilisers. The imperiance of experiments to determine the optimum amounts of fertilisers to be applied for each variety of crops must be realised. A significant experience of Japan we research worked as that improved varieties of seed are often of no use if these seeds are not supplied with sufficient quantities of fertilisers, and that the best results well not be obtained from fertilisers, if imployed varieties of seed are not used; both are necessary for maximum yields.

Plans have been drawn up for improvement of irrightion and dringge facilities over 5 million across, for developing 700,000 acrosses a whend by irrightion, and bringing a million across of form than draws and and refood crops. About 17 per cent of the programme has been accomplished in the past two years. 16 per cent of Japan's area is now cultivated and if these schemes are put through, 5 per cent more will be cultivated for food crops in the future.

Mechanical farming is unsuited to conditions in Jepan because of the small size of holding and the pressure of population on land. Only 5,532 acres, or 0.04 per cent of the total cultivated area is now under mechanical cultivation. The plan of the Japanese Government to bring another 1.5 million hectares of land under cultivation during the next 5 years includes a more extensive use of machinery. (From "Daily Advance," reprinted in Travancore Information and Listener, April 1949.

#### APPENDIX B

#### MANURIAL TRIALS WITH TOWN REFUSE COMPOST

- (1) Trials carried out at Indore.
  - (a) Wheat : -Yields of Grain and straw per acre.

(Jackson and Wad, Inst. Plant Industry Indore, Bull. 1, 1934.)

And the second s	Farm Compost				ation w Compos		Sulphate of ammonia.		
	36 lbs. N.	. 73 lbs. N.	110 lbs. N.	36 lbs. N.	73 lbs. N.	100 lbs. N.	36 lbs. N.	73 lbs. N.	110 lbs. N.
Grain	1,325	1,483	1,329	1310	1,757	1,886	1,037	1,080	1,210
Straw .	1,526	1,708	2,117	1,430	2,147	2,162	1,244	1,352	1,472

- Note, -(i) Farm and habitation waste composts gave higher yields than sulphate of ammonia.
- (iv) When the dose of habitation Compost was increased from 63 lbs. N to 73 lb. N the extra yield of grain obtuned works out to 12 lbs. for each additional lb. of nitrogen Further increase of dose, yielded 3.5 lbs. extra grain per lb. N.
- (b) Irrigated Wheat (Pansep-et al. v. A. B. Stewert's Report, 1947).

#### Yields of wheat lb. per acre.

N per acre			I	F.Y.M.	Compost	Nightsoil	Amm. sulph.
37 lbs.			• •	1.422	1,363	1,348	1,068
73 lbs.	. •		;	1,526	1526	1,807	1,111
110 lbs.		• •	!	1,532	1,881	1,837	1,244

Note.—(i) Nitrogen from organic sources proved more effective than ammonium sulphate. Increasing the dose of compost from 37 lbs. N to 73 lbs. N gave 5 lbs. extra grain per lb. extra N. Further increased dose of N upto 110 lbs. gave 9.6 lbs. grain per each lb. of additional N.

# (c) Lucerne (Jackson and Wad, Inst. of Plant Industry, Bull. 1, 1934) Yield lbs per acre—3 cuttings.

N per acre		Farm Compost	Habitation Compost			
50 lbs. N		• •			17,600	29,080
101 lbs. N				.	25,680	32,400
152 lbs. N	••		••		25,200	,38,080

NOTE .- (i) Habitation waste compost proved superior to Farm Compost

(d) Cotton (Communication from the Director, Inst. Plant Industry, Indore.)

							on lbs. per acre.
1. No manure			••		• •		348
2. Farm Compost 18 lbs.	N pe	r acre		••	••		397
3. Horse dung compost	,,				• •	••	410
4. Municipal compost	. ,,	٠,	• •	• •		••	437
5. Safflower cake	٠,,	٠,			••		438
6. Amm. Sulphate	,,	,,	••		• •		444
7. Niciphos 18 lbs. N	,,	,,		• •		• •	485
Critical difference			••			• •	62

Note.—Town Compost gave increased yield of 89 lbs, even 'no manure' which works out 5.9 lbs, extra yield per 1 lb. N. Municipal compost proved superior to Farm Compost although compost from horse dung proved equally efficient. 'Town Compost compared favourably with sulphate of ammonia and safflower cake.

(e) Paddy (Communication from the Director, Inst. Plant Industry, Indore.)

						Y	ield of paddy lbs. per acre.
1. No manure				••		••	445
2. Municipal con	apost 11	3 lbs. per	aore	••		••	925
8. Municipal con	apost 22	6 lbs. per	8070	••	••	••	1257

Note.—Municipal compost @ 113 lbs. N gave considerably higher yield over 'no manure'. The extra yield works out to 4.2 lbs. grain per lb. N. Increasing the dose of compost by another 113 lbs. increased the yield by 332 lbs.

<sup>(</sup>ii) By increasing the dose of Town Compost from 50 lbs, N to 101 lbs. N., an extra yield of 84 lbs, of lucerno per each additional lb. N was obtained. When the dose was further increased to 152 lbs. N, the extra yield obtained was 111 lbs, per lb. extra N.

Crops.—Jowar, Groundnut and Wheat (Communicated by Director, Inst. Plant Industry, Indore).

<i>;</i>		1934-35.			
	Jowar grain	Yield in lbs. per acre			
		G Nut (in pods)	Wheat grain		
1. No manure	248	282	525		
2. Farm Compost @ 126 lbs. N per	320	351	559		
3. Municipal compost @ 113 lbs. N per acre.	319	515	601		
		1935-36			
I. No manure	848	827	467		
2. Farm compost @ 126 lbs. N. per acre.	928	983	469		
3. Municipal compost @ 113 lbs. N. per acre	1,012	1,062	604		

Note.—A significant response to the application of municipal compost is observed in the case of all three crops. The response on jowar was more or less equal to Farm Compost but in the case of G. nut and wheat, Municipal compost proved superior. The average response to 1 lb. N of Municipal compost comes to 1 ·0 lb. for groundnut and 1 to 2 lbs. for wheat and jowar.

- (2) Trials carried out in United Provinces.
- (a) Wheat (Panse etal in A. B. Stewart's Report, 1947).

Manure						Nitrogen lb. per acre	Response lbs. grain per lb. N.
F. Y. M.	٠.			••		- 60	3.6 (12)*
Cattle dung		• •		• •		115	1.6 (7)
Compost	••	••	••	••		80	2.7 (5)

No of trials a sraged.

#### (b) Paddy (Indian Farming, June 1947).

Treatment					Yield of rice lb.
Sulphate of ammonia 50 bs. N	• •	• •	••	••	1, <b>31</b> 3
Farm compost 50 lb. N	• •	••		•	1,267
Town Refuse Compost 50 lbs. N				••	1,214
Mayadas' compost 50 lbs. N					1,179
Indors Compost 50 lbs. N				••	1.072
No manure		• •	• •		934

NOTE.—Application of composts or sulphate of ammonia gave significant increase in yield. I lb. N in Town Compost gave 5.6 lb. extra yield graft.

#### (c) Paddy (Indian Farming, June 1947).

Treatment				Yield of rice lb. per acre.
No manure	 • •	• •	••	848
Town refuse compost 50 lbs. N	 • •	• •		1,020
Town refuse compost 100 lbs. N	 • •	• •	••	1,207
Town refuse compost 150 lbs. N	 • •	• •	•••	1,406

Note.—Increased response was obtained when the dose of town compost was increased. Extra grain obtained works out to  $3\cdot7$  lbs. per lb. N.

#### (d) Wheat (Indian Farming, June 1947).

	The second se	1	Yield in It	os. acre
		:-	grain	straw
No manure	<del></del>		1,613	2,345
Fown Refuse compost 50 lbs. N	••		1,749	2,468
Town Refuse Compost—100 lbs. N.	••		1,925	2,752
Town Refuse Compost—150 lbs, N.	••		2,101	2,996

Nors.—There is a proportionate increase in grain and straw yields with increasing done of manure. 1 lb. N. yields 3.2 lb. extra grain,

#### (e) Wheat (Indian Farming, June 1947).

(Carried out on cultivators' lands).

Form Yord Manure-375 c.ft.	••	••		••	Yield in lbs./acre 760
Town Compost 325 o.ft.	• •	• •	• •	• •	1,060
Calculated yield for 375 o. ft.	• •	**	• •	• •	1,210

Move.-Town Compost is more effective than an equal volume of F. Y. M. J

#### (3) Trials carried out in Central Provinces and Berar.

#### (a) Jowar (Communication from C. P. Government).

		Basi	m Farm	Yeotmal Farm		
		Grain lb./acre	Straw lb./acre	Grain lb./acre	Straw Ib./acre	
(1) No manure		992	3,246	267	1,361	
(2) 10 Carts compost		1.118	4,575	300	1,846	
(3) 20 Carts compost	'	1,452	5,680	347	1,963	
(4) 10 Carts cattle manure		1,142	3,473	320	1,927	
(5) 20 Carts cattle manure		1,043	3,366	413	1,980	
('ritical difference and 5% level		135.6	715.2	52+4	377.2	

Note. At Basim, cattle manure upto 20 carts gave no increased yield. Town compost at 20 carts gave significant increased yields of jowar.

At Vectmai eattle manure proved superior town compost. Significant increases in yields were obtained with 10-20 carts of stattle manure and 20 carts town compost.

#### (b) Paddy (Communication from C. P. Government).

Labhandi F	Grain lh.	Straw lb. per acre		
(1) No manure	 • •		1,348	1,277
(2) 10 carts compost			1.497	1,678
(3) 20 carts compost .	 ••		1.890	1,997
(4) 10 carts cattle manure	 	[	1,337	1.343
(5) 20 carts cattle manure	 	. ;	1,588	1,587
(6) 5 mds groundnut cake	 		1,743	2,617
Critical difference at 5% level	 		124	281

Norn.—Compost at the lower dose of 10 cares has given increased yields equivalent to 20 cares eattle manure. Increased dose of compost from 10 cares to 20 cares increased the yield from 1,497 lbs. to 1,690 lbs. per acre.

# (c) Paddy (Communication from C. P. Government).

					Baighat Farm— Yields lbs. 'per acre
					Grain
(1) No manure	.,	••	••	••	906
(2) 10 carts compost	••	••	••	••	1,146
(8) 20 carts compost	• •	••	••	••	1,280
(4) 10 carts cattle manure	• •	••	• •	••	1,120
(5) 20 carts cattle manure	• •				1,200
(6) 5 mds, groundnut cake	••	•	••		1,360
(7) Ammonium sulphate 150 lbs				••	1,413
Critical difference at 5% level					40.3

Note.—Ammonium sulphate at 150 lbs. per acre is superior to other manures. Between town compost and cattle manure, there is no difference at the lower dose of 10 Cart. At the higher dose of 20 carts, town refuse was significantly superior to cattle manure.

# (d) Wheat (Communication from C. P. Government). Yields -Grain lbs. per acre.

-						Powerkheda Farm	Saugar Farm
(1) N	to manure	••				513	850
(2) C	ompost 10 carts	••		• •	••	553	1,004
(3) C	ompost 20 carts	••	• •	•		363	937
(4) C	attle manure 10 ca	rts	• •			527	1,058
(5) C	attle manure 20 ca	rts				546	712
(6) G	roundnut cake 4 n	ads.		••		373	699
(7) A	mmonium sulphate	20 lbs.	per acre			673	683
Critica	al difference at 5%	level		••		11.6	12.0

Note:—At Poverkheda am. sulphate at 24. ibs. N gave the maximum yield. Town compost gave higher yields than cattle manure. The yields obtained with groundnut take were low due to bad germination.

At Saugar the bulky organic manures showed superiority over amm: sulphate. The arganic manures applied at the lower dose of 10 carts gave higher yields than the dose of 20 carts.

# (e) Groundent (grown to test residual effect of organic manure applied to previous rice crop.) Communicated from C. P. Government).

Treatment to pro	evious	paddy.				im Farm. Yield is /per sore.
(1) No manure				••	••	687
(2) Compost 10 carts		• •	• •	•	• •	838
(3) Compost 20 carts		••				952
(4) Cattle manure 10 carts			• •	• •	• •	746
(5) Cattle manure 20 carts	• •	• •	• •	• •		787
(6) Groundnut cake 4 mds.		••		••		638
Critical difference at 5% let	rel	••	• •	• •	• •	23.0

Note.—Residual effect of bulky organic manures on groundaut was shown to be highly significant. Town refuse has better residual effect than cattle manure. The double doses of 20 carts of manures were better than the single dose of 10 cart-loads of manure.

#### (4) Trials carried out in Bombay Province.

(a) Jowar (Unirrigated) (Communication from Bombay Government).

granded we are any year strategies to			Surat Farm		Dharwar
			1945-46	1946-47	1945 Kharif
(1) No manure .			1,228	914	2,660
(2) F. Y. M4 carts			1.276	927	2,716
(3) Town Compost4 o	arts		1,832	1,922	2,978
Critical difference		••	79.98	108	129-2

Note.—F. Y. M. gave no significant increase in yield. Compost at the same rate gave higher yields which were statistically significant.

#### (b) Trials carried out on cultivators' lands during 1945.

de seuscialistation describes activities described and the second	lbal)		ing, Septe	mber 19	H45)		-
Particulars		Kasegai	ron village	Kort	i village	Kasogaon 4	village.
Name of cultivator		Moham	ed Hanif	Baba	Dhebe	Kavasa	lker.
Treatment compared	••	Town	F.Y.M.	Town	F.Y.M.	Town compost	No.
Area of plot	••	acres	<b>e</b> ct <b>a</b>	aore	+420	acre	*CLO

1		2	8		4	Ł
Manure added in cartloads .	. 25	30	12	12	5	Nil.
Rate per acre in cartloads .	. 10	30	12	12	5	Nil.
Crop grown	. Ground	nut	Maize		Chilly	
Season	. Kharif	1944	Kharif 10	44	Kharif 1	944
Whether irrigated or rain-fed	Irrigate	d	Irrigated		lrrigated	i
Date of sowing	lst we April 1		2nd wee		lst wee	
Date of harvest	Last w		lst wee	k of	Last we	eck of
Viold in 1b. from, the whole area under treatment.		840	1,440 lb. grain	720 lb.	170	4(
Sield per acro in lb.	. 960	840	Do.	grain Do.	340	160

# (c) Trials carried out on cultivators' lands during 1946-47.

***						*		
		Item			3	et A.	Set	В.
•		rem			Manured	Unmanured	Manured	Un- manured
1. Ar	ea in acre	۹	. ,		4.0	4.0	3.0	3.0
2. As	sesument i	in Rs.			0 13 0	0 13 0	0.45 0	0 15 0
3. Soi	il	• •		• •	Medium	1 '	Black	
4. Ra	te of appli	ication of	compost	per	5 cartloads	Nil	4 cart- loads	Nel
5. Cro	op grown			••	J	owar, Safflon		red.
6. Da	te of sown	गर्फ			1-10-46			4-10-46
7. Da	te of harv	ont	• •		Fro	in 2nd to 23r	d February	1947
	eld in lbs.	per acre-			160	128	203	148
S	a <b>ffl</b> ower		••,		112	64	85	53
L	inseed	••			. 50	21	32	17
9. lno	rease over	control	-		%	%	%	0,0
Jo	1BWC	• •	••.		25		37	••
Se	Mower	••			35		60	••
Total	<b>izne</b> ed	••	<b></b>		138		99	
					,			

items	At Wakhan in N. D. Dosh	the field of Mr.	At Degaon in the field of Mr. B. N. Shende.
1. Crops grown	Jowari	Chilly	Wheat
2. Rate of application of compost per acre in cartloads.	10	15	7
3. Month of sowing	August, 1946	March, 1946	October, 1946
4. Month of harvesting	Jan. '46	Aug-Oct. *46	February *45
õ. Yield per acre in lbs	1,540	1,750	1,540
6. Vield of control in lbs. per sore (irrigated)	1,000	1,200	1,000
7. Increase over control	5 <b>4</b> ″ <sub>6</sub>	46%	54%

### (d) Trials carried out on cultivitors' lands during 1947-48.

Place	fo. of cultivators using the manure	application manure.	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1	∝. per aere Unmanu	.	% increa conti	of se over
	No. of using	Rate of of the	Grain	Straw	Grain	Straw	Grain	Straw
1. Kalyan	7	5 cart- loads	1869 · 7	2562 · 0	1648.5	2200 · 0	13.4	11.8
2. Badlapur	5	Do.	1730-0	2075-2	1609 · 2	1936-0	7.5	7.1
3. Palghat	3	Do.	2537.0	2262 · 3	2405.3	1182 · 3	5.4	6.9

N.B.—The results indicate that compost shows better effect on poorer soils then rich soils.

#### 5. Triale carried out in Oriest Province.

#### (e) Paddy (Communicated by Orisea Government).

				Yield ibs.	per acre
			-	Grain	Straw
1. No manure	••			2,827	3,987
2. 30 lbs. N Oil cake		••		2,824	4,452
3. 45 lbs. N Oil cake	••	••		2,814	4,514
4. 30 lbs. N Compost	••			3,152	3,877
3. 45 ths. N Compost		••		2,538	4,246
6. 30 lbs. N. F. Y. M	••	••		2,951	2,441
7. 45 lbs. N. F. Y. M	••	••		2,713	4,078
3. 30 lbs. N Amm. Sulphate	••	••		2,769	4,374
. 45 lbs. N Amm. Sulphate		••		2.980	4,793

Note.—Compost at 30 lbs. N gave higher yields then other treatments including Amm. Sulphate. The difference in yield between F. Y. M. and Compost are not significant.

With 30 lbs. N as Compost the increased yield obtained was 10.8 lbs. grain per lb. N.

(b) Trials carried out on cultivators' fields during 1945-46.

Crop served	No of ₩ho h	No of people who have used Compost	Vol. of Com- post used in Cft.	Area served in sores	Total yield in 158.	Increased yield per sore in lbe.	Increase yield per 100 c ft. manure in lbe.
		2	es	*	5	9	4
Cuttack – Potato Caulifower Berbampur—vegetables	:::	15 50	8,540 3,185 750	14·58 4·5 3·0	92,900 25,910 9,600	4,617 3,822 160	780 740 40
Parlakhemidi —							
Paddy	:	ಣ	1,120	9.0	14,450	428	342
Ragi		9	2,625	16.0	16,530	278	169
Samsi	:		125	9.0	800	125	49
Ladies finger	:	-	175	1.0	8,000	640	366
Brinjal	:	9	1,325	10.	118,020	1,371	776
Cucumber	:	*	575	3.05	42,500	1,131	617
Miscellaneous vegetables	:	23	4,800	24.15	349,600	1,401	703
Total of food crops	:	67	23,130	84,78	6,78,310	:	:
Chillies Tobacco Sambal pur—vegetables	:::	₩80~	700 1,276 1,200	88.85 50.05	21,100 9,120	670 678 60%	317 449 more
Grand total of food and non-food orops	. 80	8	26.305	102.18	1.37.830	:	

(c) Trials carried out on cultivators' lands during 1946-47.

Cuttack   Cutt	Name of the Bistrict		Grops	Number of propie who reported the results	Vol. of compost used in Cft.	Area Porv.	Total yields in lbs.	Increase over that without oomp. in lbs.	Increased yield per sere in lbs.	Increased yield per 100 oft, of compost in lbs.
als carried out on cultivators' lands during 1947-48.  Total  Rectablese  at total  Tetal  Total  Tetal  Total  Tetal  Te	Experiments 1. Cuttack	:	Potatos	-4	1,210	08:0	3,000	1,000	1,250	9.88
Aram	Puri	:		m m	000,1	9.4	2,∞ 2,00,00,00,00,00,00,00,00,00,00,00,00,00	1,025	212.5	102.5
Total   Brinjal   1   200   0.50   1,600   1,000   1					250 250 250 250 250 250		9,500 9,600 9,600 9,600	86.1 96.5 96.5 96.5	1964	2008 0008 0008
Total   Faddy   37   12,576   46.85   38,080   6,790   1     Scarried out on cultivators' lands during 1947-48.   1,700   1.46   2,625   10,060   1,216   Paddy   Brinjal and other   3   1,700   1.5   2,625   1,069   1,06		:	Brinjal	6	888	88	885	8	88	999
Total   56   18,116   59-32   76,100   14,106   14,106   14,106   14,106   14,106   14,106   14,106   1,276		:	8	37.	12,576	46.86	38,080	6,780	144.9	53.0
s carried out on cultivators' lands during 1947-48.         Potato       3       1,700       2       4.600       1,276       896       896       896       896       1,000       1.45       2,626       896       896       1,000       1.45       2,626       896       10,000       1,000       1,000       1,000       1,000       1,000       11,000	Total	:		55	18,116	59.32	76.100	14,105	:	:
total         Potato         3         1,700         2         4,600         1,276           Paddy         3         1,400         1.45         2,626         806           Brinjal and other         3         1,400         9         1,02,020         11,060           regetabler         13         4,960         12.96         1,12,476         14,720           Grand Total         409         3,89,630         928.44         1,954,845         489,070	(d) Trials carried out	on cul	ivators' lands dur	ing 1947-4	on.					
Feddy 3,89,530 11.950 1.056 1.	1 Cuttaok	•	Potato	_ 	1,700	2.5	4,600 2,625 25,600			5.89
totel 13 4,960 12-96 1,12,475 14,720 14,720 3,84,680 923-44 17,42,370 4,73,360 Grand Totel 409 3,89,530 936-4 1,954,845 48#,070	2. Puri : :	:	Paddy Brinjal and other regetables	m en	1,400 780		3,250 1,02,020			
409 3,89,530 936-4 1,°54,845	Urban compost total	::		396	4,950 3,84,580	12.96 923.44	1,12,475	14,720	::	: :
	Grand Total	:		803	3,89,530	936.4	1,954,845	48,070	:	:

#### 6. Trials carried out at Bangalore.

(a) Ragi.—(Monograph on Composting of Farm and Town Wastes by Acharya p. 118).

	Yield lbs.	per acre
	Grain	Straw
1. Compost from night-soil and leaves—Aerobic	2,879	4,077
2. Compost from night-soil and leaves—Hot fermentation.	2,693	4,538
3. Compost from night-soil plus leaves plus soil——Aerobic.	,169	3,807
4. Ditto Hot formentation	2,492	4,382
5. Urine plus dung plus leaves compost—Aerobic	1,847	3 <b>,433</b>
6. Ditto Hot formentation	1,977	3,642
7. Urine plus dung plus leaves plus soil compost— Aerobic.	1,725	3,154
8. Ditto Hot fermentation	1,786	3.311
9. Wood ash plus night-soil	2,971	5,044
10. Coal ash plus night-soil	1,891	3,424
11. Lime plus night-soil	2,178	3,841
12. Hongay cake—equivalent N	1,907	3,415
13. Amm. Sulphate—equivalent N	1,629	3,241
14. No manure	1,028	1,760
Critical difference	276	250

NOTE.—There is a positive re ponse obtained by the application of the organic composts in general. The response is much superior to what was obtained by the use of Ammonium sulphate. Compost prepared from night-soil and leaves gave higher response than compost from dung and urine, when the method of preparation was not aerobic.

(b) Ragi.—(Rao and Subrahmanyam—J. Indian Inst. Sci. 15 A 89) (Pot Experiment).

		Yield			
		Grain		Straw	
	.	lbs.	OZ.	lbs.	OS.
1. Refuse manure 2. Farm Yard Manure 3. Chemical Fertilisers. (N. P. K.) 4. No manure	:: ::	8 8 6 5	8 2 6 0	187 109 89 76	8 2 6 2

Norm.—Compost from town sweepings was as good as F. Y. M. and on the local soil was superior to chemical fertilisers.

The residual effects of the above manures were tested by growing ragi in the same pote in the succeeding season when the tollowing yields were obtained.

		1	Yield			
Previous treatment			Grai	n į	Stra w	
			lbs.	OE.	lba.	· Oz.
1. Refuse manure 2. Farm Yard Manure 3. Chemical fertilisers 4. No manure	• •	::	2 1 0 1	15 · 12 · 13 · 7	17 14 9 9	0 3 14 0

Note.—The refuse Compost leaver a marked residual value in the soil better than farm yard manure. Chemical fertilisers are poor in this respect.

7 Pot Experiments at Trivandrum.

(a) Paddy.--(Monograph on Composting of farm and Town Wastes by Dr. C. N. Acharya p. 116).

		1	Yield of Paddy				
		I	1	11			
		Grain	Straw	Grain	Straw		
1. No manure		100	100	100	100		
2. Cattle manure	• •	163-8	110.4	116-1	117.8		
3. Cattle manure plus ash		173.5	119.2	156-3	142.2		
4. Night-soil compost		248-2	173.4	213.3	186 · 2		
5. Night-soil compost plus ash		276 · 1	176.5	240.6	203 · 8		
or angus		'	1	•	ħ		

Norz.—Night-soil compost proved superior to cattle manure and gave 2.76 times the yield of unmanured pots.

8. East Punjab (1946-47).

	Bajra fodder (mds.) per acre)	Residual effect : Oats fodder (mds.) per acre)
Town Compost (prepared in pits)     Town compost (prepared in heaps)     Control (no manure)	875 · 0 326 · 5 295 · 8	111-4 - 83-6 75-4

#### APPENDIX C

# STATISTICS OF COMPOST PRODUCTION AND DISTRIBUTION (URBAN COMPOST SCHEME) FOR THE QUARTER ENDING 31-3-1949.

No.	Name of the Province or State.	No. of Centres operating		Vol. of Compost sold dur- ing the period (2/3 basis)	Total Vol. of compost sold during the year from lst April	of com- post (old and new)
			cu. ft.	cu. ft.	cu. ft.	cu. ft,
ì	Ajmer-Merwara	4	54,500	12,250	1,14,420	5,07,665
2	Baroda	15	1,65,162	30,475	1,11,150	3,83,327
3	West Bengal	25	2,64,800	1,05,175	3,51,325	6,07,835
4	Bihar	22	3,09,675	2,08,568	6,56,173	9,91,100
5	Bombay	74	9,95,580	11,99,720	25,11,850	51,05,395
6	C. P. & Berar	94	9,92,500	17,11,750	21,91,550	25,86,625
7	Cochin State*	6	27,695	43,826	96,077	1,07,370
8	Delhi	4		46,260	1,88,730	••
9	Hyderabad State	<b>3</b> 5	65,491	36,348	2,42,056	4,87,787
10	Madhya Bharat	26	2,46,625	2,24,800	4,64,950	9,19,925
11	Madras	92	14,39,046	12,17,099	52,08,375	57,00,337
12	Mysore State	76	4,27,190	36,660	7,87,350	14,68,230
13	Orissa	8	1,01,100	34,810	70,900	1,83,340
14	East Punjab*		13,350	67,600	77,600	2,28,955
15	Travancore State*	14	66,338	2,11,220	3,73,114	1,40,853
16	United Provinces	183	37,12,350	26,08,080	102,83,350	79,41,980
	Total	686	88,81,402	77,94,641	237,28,970	273,65,724

<sup>\*</sup>The reports from these areas are for the quarter ending 31-12-1948.

This Bulletin is intended for the information of officers engaged in operating Compost Schemes, in order to keep them posted with the latest scientific and practical developments taking place in their field, in India and abroad. It must be understood, however, that the views expressed in this Bulletin are not binding on the Government of India.

## **COMPOST BULLETIN**

(A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

Issued by the Compost Development Officer, Ministry of Agriculture,

Government of India

VOL. 2 NO. 3 SEPTEMBER 1949

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## COMPOST BULLETIN

## 1. Our New Food Comn.issioner and the Compost Programme.

Shri R. K. Patil. Food Production Commissioner to Government of India, who has been entrusted with the onerous task of accelerating the Grow More Food Campaign so as to make India self-contained in the matter of food by the end of 1951, has reorientated the whole campaign so as to ensure large scale results being obtained in a short time. In his first Press Conference held on 9th August 1949, he placed before the country a feur-point plan to increase food production by 4,400,000 tons by the end of 1951. Of this increase 3,610,000 would be secured through intensive cultivation, 300,000 tons from reclamation of weed infested and new land by means of tractors, 260,000 tons through tube-well irrigation and 230,000 tons by diversion of the acreage under sugarcane to foodgrains. The above plan would show the relative importance of the different items for achieving immediate results. Intensive cultivation which is expected to produce nearly 82 per cent. of the extra 100d we require, depends essentially on extra manure and extra water. To obtain 3.6 millions of tons of extra food by better manuring, we require 350,000 - 400,000 tons of nitrogen. Our present supplies of fertilizers, including imported ones, contain only 40,000 - 50,000 tons of nitrogen, whereas nearly 2 million tons of nitrogen are now wested in our urban and rural areas due to improper conservation and incomplete utilization of human and cattle wastes in the urban and rural areas. As such, the success of the programme of intensive cultivation, chalked out by our Food Commissioner, depends essentially on the proper conservation and utilization of the very large quantities of urban and rural refuse now going to waste. Town waste must be utilized with the help of necessary legislation, cattle urine must be conserved to the maximum extent possible and the misuse of cattledung for fuel should be stopped by organising extensive tree planting for supply of alternative fuel, followed by prohibitive legislation at a later stage.

## 2. H.E. The Governor General and the Hon. Prime Minister on "Compost".

Both H. E. the Governor General (The Hon. Shri C. Rajagopalachari) in his broadcast Appeal to the nation on 6th July 1949 and the Hon. Prime Minister (Hon.Pt. Jawaharlal Nehru) in his address on 6th August, 1949, laid pointed stress on the importance of the Compost programme in implementing the food self-sufficiency plan of the Government. The Governor General in his Appeal said:

"This great mother, the ground on which we walk and live, is a wonderful mother, most generous, most forgiving and most skilful. Put anything into it, be it the worst rotten stuff, mere offal or what we throw out as excrement, this ever-loving sleepless mother converts it for us by an alchemy of her own into rich food which shoots up, juicy and fragrant. But she requires a little help from us, just a little help and some watchful co-operation. You must know what to sow as seed and when, and look after the shoots that come up. The earth returns with interest what you put in. Receiving offal and excrement, she gives us back pumpkins, cucumbers, bananas, whatever we know how to raise.

"Urban authorities should consider it their sacred obligation to collect and conserve town refuse and make good manure out of it and place it at the disposal of gardeners and cultivators of land at a reasonable price. People gather more and more into urban areas and it is the duty of the civic authorities to remember their obligations to the rural areas that feed the towns and return at least in part the nitrogen that flows into the urban areas. This can be done by careful conservation and disposal of the organic refuse of the towns. Apart from animal droppings, what is thrown out by townsfolk is a continuous and considerable drain on the rural areas unless there is an organized movement of manure from towns to villages."

### 3. What Voelcker said in 1893.

Dr. J. A. Voelcker belongs to the group of the pioneering agricultural scientists who followed in the wake of the renaissance of European agriculture ushered in by the researches of Liebig and Mendel. He was Agricultural Chemist to the Royal Agricultural Society of England and was later in charge of the

Woburn Experimental Station. In 1893 his services were requisitioned by the Government of India for preparing a Report on the then agricultural conditions in India, in which connection he made a tour of the country and prepared a Report on "Improvement of Indian Agriculture", which stands even today as a monument of deep thinking and full understanding of the Indian problem. It is rather a sad commentary that Dr. Voelcker's Report prepared in 1893 applies, with almost equal force, to present day conditions in India. As his Report has been long out of print and copies are not readily available, extracts from the Report containing his observations on the manurial position in India are given in Appendix B and would be read with interest even to day.

### 4. Five Years of Compost Development in India.

It was in the beginning of 1944 that Compost work on an all India scale was started in all important Provinces and States and it would be useful to assess the results achieved in the first five year period. A Note outlining the progress made so far under both the urban and rural Compost Schemes is printed in Appendix "A" of the present issue of the "Compost Bulletin", from which it would be seen that the present production of urban Compost (about 7 lakh tons) amounts to about 7 per cent. of the total potential capacity and that of village refuse Compost (about 30 lakh tons) amounts to about 3 per cent. of the total capacity for extra production of manure. The Schemes however, have gained considerable momentum during the current year on account of the plan for intensive cultivation, which has been chalked out by the Government of India for execution during the years 1949-50 and 1950-1951. It is expected that due to the above drive, the present rate of Compost production would be doubled under both the urban and rural Compost Schemes during the coming year. Several Provinces have already passed legislation compelling manicipalities to convert all their refuse into manure and other Provinces and States have similar legislation under consideration

### 5. East Punjab promulgates Ordinances for Compost.

H.E. the Governor of East Punjab has recently promulgated two important Ordinances in connection with Compost making. The first one deals with the conservation of village manure and requires each villager in the notified areas to de-

posit his cattleshed and other refuse in pits in accordance with the procedure prescribed by Government. Village Panchayats or special ad-hec Committees to be formed by the Director of Agriculture, are empowered to enforce in their notified areas the provisions of the Ordinance, under which people are liable to a fine if they do not store their cattleshed and other refuse in pits, but throw it carelessly in heaps here and there. The above Local Committees have got the responsibility to provide sufficient land in the immediate outskirts of the village for digging manure pits for use of those householders who do not possess land of their own in or around their houses for such pits. Govt. have promised to acquire necessary land for the above purpose.

In the above connection it may be mentioned that one of the practical difficulties that may be met with in operating the Ordinance would be the considerable delay that occurs in the usual land Acquisition Proceedings. Recertly, U.P. passed an Act to enable expeditious requisitioning of land needed for common good purposes of the village, including compost making, and it would ensure the success of the East Punjab Ordinance if it can be supplemented by another whereby necessary land for compost making could be immediately requisitioned on lines similar to the U.P. Act.

Under another Ordinance, the East Punjab Govt. have taken powers to compel the municipalities in East Punjab to convert all their urban refuse into compost manure. There are 17 municipalities in East Punjab and these together can produce about 200,000 tons of manure per year.

The texts of the Village and Urban Manure Ordinances are given in Appendices C and D to the present issue of the Compost Bulletin.

### 6. Intensification of Village Compost Schemes.

In view of the decision taken by the Government of India to make India self contained in the matter of foodgrains by the end of 1951, it is necessary that Village Compost Schemes should be intensified and extended as rapidly as possible to cover all the villages in each Province and State. In view of the limited Agricultural Staff available, however, it is not possible to post an Agricultural Mukadam or Kamgar for every group of 5 or 10 villages. For the rapid expansion of the Village

Compost Scheme, therefore, it is necessary that the existing Revenue Staff in the villages viz. the Patwaris, Patels, Munsiffs and Karnams should be utilized for supervising the work of Compost production in their respective villages. The Government of India have recently decided that Deputy Commissioners should be placed in charge of the Grow More Food Campaign in their respective areas, and as such it should be easy to issue necessary instructions to all Revenue Staff in villages that they should guide the villagers in the matter of proper preservation of manure and increased manure production.

For the above purpose, the plan of work under the existing village Compost schemes may have to be suitably modified so as to provide the Provincial Compost Development Officer or Biochemist with a number of Assistant Compost Development Officers (Rural) at the rate of one for each group of 4 or 5 Districts, who could hold brief Training Courses at each District Headquarters at which all the Tehsil Agricultural Assistants could be trained in the improved methods of Compost and manure preparation, with special reference to (a) cattle urine conservation, (b) manure preparation by sectional filling of trenches, (c) composting of special types of refuse like sugarcane trash, forest leaves, water hyacinth etc, (d) Wardha System of Trench Latrines for villages, and (e) Tree Planting for Fuel. The Compost Training Course would last for one week only.

As soon as the Tehsil Agricultural Assistants finish their training, they would in turn hold similar training courses at each Thana or Circle in their Tehsil, at which the Patwaris of the villages situated in the Thana or Circle could be trained for a week. After this, the Patwaris should hold similar demonstrations in their villages, so that all the villages may know and adopt the improved methods of Compost making and manure preparation.

Before the Patwaris undergo training, they should first be asked to fill up and submit returns in the prescribed form showing:— (a) a list of householders in their village, (b) the number of cattle maintained by each householder, and (c) the volume manure (in terms of cartloads) prepared or applied to the land by each householder during the previous *kharif* and *rabi* seasons. Based on these returns, targets of increased manure production will be fixed for each village, so as to step up the production by 25 per cent each year.

The Patwaris will be made responsible for sending to the Director of Agriculture of Food Production quarterly statements showing (a) the number of pits in operation in the village, (b) the total volume of manare applied to land during the quarter and (c) the volume of manure in stock at the end of the quarter. They may be granted certificates of merit or special honorarium if they fulfil the targets of increased manure production fixed for their villages.

The Agricultural Staff as well as the supervisory staff maintained under the Compost Development Officer/Provincial Biochemist will check the returns sent by village Patwaris, by random sampling while they proceed on their normal tours. They will also take from time to time, some samples of manure for purpose of analysis, with a view to estimating the improvement in quality brought about by the operation of the Compost Scheme.

For the success of the work, it is necessary that in addition to training the Village Patwaris, active co-operation of the Village Panchayat, Gram Sabha, or other local Village Committee should be secured in operating the Schemes.

## 7. Dosage of Urban Compost for different crops.

It is well known that increasing quantities of manure do not give proportionately increased yields and there is always an optimum dosage of manure at which the margin of profit is greatest. Such optimum dosage of manure depends on the nature of the soil and water-supply and the type of crop grown; and it also depends on the current market price of the crop grown and the price to be paid for the manure including transport charges and cost of spreading on the field. The last two factors (viz. price of crop and of manure) are highly variable even in the same place from year to year, but they are the deciding criteria for the individual cultivator. It would be useful, therefore, to have some average figures for dosages of manure which have been found to be most profitable for different types

of crops, so that these averages could serve as the guide for further experimentation on the subject. They are as follows:—

Nature of crop	Dose of Manure	Cost of manure (includ- ing trans- port)	Extra yield expected per acre in maunds	Value of extra yield per acro
		Rs.		Ra.
1. Barani (rainfed—Rabi Wheat, gram oil seeds etc.	100-150 cu. ft. or about 3 tons (1 truckload).	12 to 15	2 to 3	20 to 30
2. Barani (ra nfed) Khar- if Jowar, maize, ground nut, rice, etc.	100—150 cu. ft. or about 3 tons (1 truckload).	12 to 15	3 to 4	30 to 40
3. Irrigated Rice	250—300 en. ft. or 5 to 6 tons (2 truckloads).	25 to 30	4 to 5	50 to 60
4. Potatoes or sweet potatoes.	500—600 cu. ft. or 12 to 15 tons (4 to 5 truck- loads.	50 to 70	25 to 30	125 to 150
5. Bananas .	500—600 cu, ft, or 12 to   15 tons (4 to 5 - truck-   loads).	50 to 70	40 to 50	150 to 200
6. Vegetables (cabbage, cauliflower, tomatoes etc.).	500 to 600 cu, ft, or 12 to 15 tons (4-5 truck- loads).	50 to 70	25 to 30	150 to 200
7. Sugarcane	500-600 cu. tt. or 12 to 15 tons (4-5 truck- loads).	50 to 70	80 to 100	100 to 150

### 8. Composting of sugarcane trash.

There are nearly 3½ million acres under sugarcane in India and at the rate of 3 tors per acre of trash including dried leaves cut tops etc., nearly 10 million tons of sugarcane trash are available for proper utilization. At present the material is mostly burnt in the field, since it has been found that the trash rots very slowly and if the unrotted material is ploughed into the land, it reacts harmfully on the succeeding crop on account of its wide C/N ratio (about 100:1 or wider) which fixes up the soil nitrogen and makes it unavailable to the following crop.

Methods of accelerating the decomposition of sugarcane trash have been recommended from time to time and these are

adapted to the local conditions of the area in which they have been worked out. Thus, at Indore sugarcane trush has been interspersed in alternate layers with green manure (sunn-hemp) and moistened with cowdung slurry. Two turnings were given to the mass at 3 month intervals, and at the end of 7 to 8 months, a good type of well decomposed manure was obtained. The main limitation of the method was the difficulty of obtaining enough green manure at the spot to decompose all the sugarcane trush.

In Bombay Province, a simple method of composting sugarcane trash has been worked out, utilizing shallow trenches 2 to 21 ft. depth dug along-side the water supply channels. Each one foot layer of trash is covered by a thin layer of earth, and cow-dung slurry is added in enough quantity to moisten the mass thoroughly. The mass is built up in the above manner to a height of 2-3 feet above ground level, and covered top with a layer of earth. On account of the vicinity of the water supply channels, there is steady percolation of moisture into the bottom layers of the manure trench and this moisture steadily rises up and helps to produce rapid decomposition of the whole mass. In 6 to 7 months time the mass is fully decomposed and yields manure containing about I per cent. of nitrogen, but if it is desired to shorten the period of decomposition, the material may be taken out of the trench after 2 to 3 months and formed into a semi-circular overground heap and plastered with earth. The manure is ready in another one month's time.

The Indian Institute of Sugar Technology have also been examining the problem from the point of view of the simultaneous utilization of sugar factory products like press-mud, molasses, wash water etc. They have worked out a satisfactory method of composting sugarcane trash by the addition of press-mud and molasses as starters and have obtained manure containing nearly 1.5 per cent of nitrogen. A note on the subject recently published by the Institute is given below:—

#### COMPOST FROM PRESS-MUD AND CANE TRASH.

"As a result of experiments carried out over a number of years at the Indian Institute of Sugar Technology, it has been possible to standardise the method for the manufacture of compost from sugar factory by-products in the factory premises.

"An idea of the large quantity of compost that can be prepared for the benefit of the Indian agriculturist can be gauged from the figures given below, which show the quantities of cane trash and filter press cake which may on an average be available in sulphitation sugar factories.

- Carried Time 2 of Transfer Carried			U. P.	Bihar	India
	 		tons	tons	tons
Cano Trash	 •		57,500	23,000	98,000
Filter Press Cake	 	 	142,750	57,000	2,45,000
Dry matter in cake	 	 	57,500	23,000	98,000
		· ·	•	1	

<sup>&</sup>quot;It is well known that press-mud, besides containing valuable Nitrogen and organic matter, contains appreciable quantities of phosphates and potash and compost prepared from this material wil! also contain these ingredients.

#### METHOD OF COMPOSTING.

"The process consists of mixing one part of cene trash with three parts of dry press-mad or six parts of wet press-mud by weight, which is made into a kerp. This mixture will contain approximately one per cent of Nitrogen and the C: N ratio will be about 30:1 To this heap is further added molasses and cowdung each 2 parts per 100 parts of the hear by weight in the form of a slurry made with water. The whole mass is then mixed up so as to make it sufficiently moist. The mass is again made into a heap on level ground (not in a pit) The moistened heap should be kept on level ground for a period of 8 to 10 days so as to allow it to undergo aerobic fermentation ing this period, a rise in temperature takes place, which may go up to 60° or 65°C. After ten days the moist heap is transferred into Kachcha pits of sufficient size and the material is tightly packed therein. The heap is then covered with a layer of mudpaste and allowed to remain there for a period of 6 to 8 months. During this period an-aerobic fermentation goes on, and complete disintegration of the material takes place. When the material is found to be of a powdery structure and a greyish black appearance, the compost is considered to be ready. The pits are then opened and the Compost taken out and is ready for use. On an average, such compost is found to contain about 1.5 per cent of nitrogen.

"Cropping experiments carried out at the Agriculture College, Kanpur, have shown that the average yield of sugarcance increased from 800 mds. to 1,015 mds. (about 25 percent extrayield) with the application of 90 mds of this compost per acreover the basal dressing of 15 cart loads of farm yard manure per acre. (The control experiment which gave the yields of 800 mds. per acre also received a basal dressing of 15 cart loads of farm yard manure). It is estimated that the cost of labour for producing this compost would not exceed 3 annas per 100 lbs. of the compost or annas 2 per lb. of Nitrogen. The cost of the raw material will be small.

"The other advantage of manufacturing such a compost is that it can be prepared in an organised manner in sugar factory premises and can be transported to the fields in the carts which return empty after unloading the cane. Alternatively, the cultivator can himself prepare the compost by taking the required quantities of press-mud and molasses from the factory in his empty cart and utilising the cane trash available in his field. Further, such a compost will definitely be better than other organic manures as it will also contain, besides nitrogen, appreciable quantities of Potash and Phosphates."

### 9. Compost Development in Madras.

The first meeting of the Provincial Compost Development Committee recently constituted by the Madras Government, was held on 15th June 1949 under the chairmanship of the Hon. Shri A. B. Shetty, Minister for Agriculture, Madias Province. The Heads of different departments concerned in Compost production and some non-officials were present.

The Committee briefly reviewed the progress made under the Compost Schemes and fixed a target of 150,000 tons of Compost to be prepared from urban refuse during 1949-50 and instructed the Compost Development Officer to prepare necessary plans for stepping up production and distribution to the above level during the current year. The Committee also considered in detail the report prepared by the Special Officer, Compost, on the cost of Compost production and the price at which Compost is sold at different municipal centres, and after discussion, recommended that a uniform price of Re. 0-10-10 per cartload (25 cu. ft. or  $\frac{1}{2}$  a ton) of manure should be fixed as the sale price at all the Municipal Depots. The Committee

did not favour the system of auctioning the whole of the manure stock available in the Municipal Depot to the highest bidder, since this would tend to raise price levels to the disadvantage of the purchaser, and recommended that the manure should be sold to the ryots directly or through Co-operative Societies at fixed rates.

It was decided that the Provincial Compost Development Officer was to work under the Inspector of Municipal Councils and Local Bodies.

### 10. Composting of paddy husk.

Experimental trials have been recently carried out in Central Provinces & Berar to utilize the large quantities of paddy husk that are now available at the dehusking mills situated all over the rice area. In view of the fact that over 58 million acres are under rice caltivation in this country and about 20 million tons of rice are produced annually, the quantity of paddy husk that is produced may be estimated at about 10 million tons per year. This figure is almost as great as the total quantity of town refuse produced in India. It is, therefore, necessary that as much attention should be paid to the proper utilization of paddy husk, as is being paid to the conversion of urban refuse into manure. A special difficulty with paddy husk is its high content of silica, which hinders rapid microbial decomposition. Attempts have been made in the Central Provinces (Gondia) to mix shellac wastes which are rich in nitrogen, (shellar waste powder, 3 percent nitrogen) and shellar waste water as starters for decomposing paddy husk. The composting is carried out in trenches (10 feet length, 5 feet breadth and 21 feet depth) interspersing thin layers of earth between layers of paddy husk and shellac waste powder. Different proportions of paddy husk, shellac waste powder and shellac waste water were tried, and it was found that a proportion by weight of 1 part paddy husk and 1 part of shellac waste powder, well mixed and moistened with one part by weight of shellac waste water, interspersing one inch layers of earth between successive layers (6-9 inch thickness) of paddy husk, decomposed satisfactorily and gave a brownish black powdery compost in about 6 months' time.

In Bombay Province (at Dharwar), paddy husk was mixed with an equal volume of town sweepings and this mixture

was made to alternate with layers of night-soil as in the Bangalore Process of composting. As an alternative, paddy husk was first treated as bedding under cattle for 3 successive nights and after moistening with water, was placed in the trenches. Of these two treatments, the latter gave better results and a final product, yellow in colour and powdery in composition, was obtained after 11 months of composting. Chemical analysis of the compost showed that it contained on the dry basis, about 2.2 per cent. of nitrogen, 1.6 per cent. of phosphoric acid, 1 percent. of potash and 2.9 percent. of calcium, In the above connection, it would be worth examining whether the period of decomposition could be shortened by adding to the refuse as starter" some portion of actively fermenting paddy husk compost (2 to 3 months old) which may be rich in the microorganisms, which would break down the siliceous layer and decompose the hemi-celluloses and lignin which are found to occur in good proportion in paddy husk.

### 11. Tree Planting for fuel in East Punjab.

Reports of large scale Tree Planting work being carried out in Bombay, Madras and other Provinces have already appeared in the columns of the Compost Bulletin (vide Vol. II Nos. 1 and 2). A further report outlining the big plans for establishing fuel plantations in different parts of East Punjab, that are now under execution, is given below:

"With a view to making fuel wood available at cheap rates in all parts of the Province, the East Punjab Government are taking active steps to enclose all uncultivable wasteland and to grow trees therein. Their programme during the carrent year is as follows:—

## (i) Afforestation of waste lands.

"About 19,000 acres of land has been allotted in Amritsar, Ladhiana and Gurdaspar districts for afforestation which has started in Ludhiana district and will commence in the other districts in the rainy season. The question of allotment of another 3,00,000 acres of Muslim evacuee forest and waste lands in Karnal, Hissar, Hoshiarpur and Ambala districts is under consideration.

## (ii) Afforestation of strips of waste lands along canals and roads.

"The waste lands along the Upper Bari Doab Canal have already been placed under the Forest Department for afforestation. Planting is proceeding apace there according to plan. The question of placing other similar areas at the disposal of the Forest Department for this purpose is under consideration. The total area of such waste lands is bout 50,000 acres.

## (iii) Section 38 (Indian Forest Act) Areas.

"Individual owners of waste lands are being persuaded to have their lands closed and planted up by the Forest Department. Approximately 1½ lakh acres have been so closed already.

### (iv) Irrigated Plantations.

- "In order to meet the requirements of industry and large cities, the question of allotting 20,000 acres of land for establishing irrigated plantations is being considered."
- 2. Besides the above schemes, orders have been issued to local officers to encourage the plant, tion of trees along road-side avenues belonging to District Boards and along village roads. The reports received in this respect are encouraging. Further, to minimise the burning of cow dung for fuel, orders have been issued to plant quick growing trees every year in observance of the Indpendence Day.

## 12. Volume weight relationship of Town Refuse Compost.

Urban Compost and for the matter of that, all bulky organic manures are used in terms of cart-loads or truck-loads. Primary measurement in both cases is by volume, and it is a fact that the volume of such bulky manures offers a better criterian of their content of plant nutrients than the weight. The latter is influenced considerably by the variation, in the proportion of moisture and earth, which by themselves do not possess any manurial value, whereas the "volume" is affected to a much lesser extent by the above factors. An article dealing with the subject in detail has already appeared in "Indian Farming" (March 1947, page 133), in which it was suggested that all statistics of production or distribution of bulky organic manures should be expressed in terms of 'volume' rather than of 'weight'.

In several of the existing reports, however, published in Europe and America as well as in India, the custom has existed of expressing the quantity of bulky organic manures like farmyard manure or compost, in terms of "tons". This is possibly due to the fact that other fertilizers like chemicals or oil cakes are all expressed in terms of weight rather than of volume and for the purpose of comparison with such fertilizers, it is convenient to express the quantities of organic manures in the same denomination. Another possible advantage is that the figures expressed in terms of 'tons' are often smaller and give a clearer mental picture of the quantity used, rather than the huge arithmetical figures which have to be used when the quantities are to be expressed in terms of volume by cu. ft.

Even in such cases where bulky organic manures are expressed in terms of 'tons', they are rarely weighed and the primary measurement is often the volume (say, so many cart loads or truckloads) and a factor is used for converting 'volume' into 'weight'. A factor largely used has been the relationship, 50 cu. ft. of compost weighs one ton.

Recently the correctness of the above volume-weight factor has been questioned in the case of town refuse compost as giving a too low estimate, since urban compost, especially under the conditions prepared in India from unscreened town sweepings and hight-soil is rich in earthy impurities and as such weighs about 50-55 lb. per cu. ft.

This matter has recently been examined at several urban centres in India and the results so far reported go to confirm the validity of the objection that the volume weight factor of 50 cu. ft. is too high for urban compost. The average results reported from different areas are as follows:

Province .						No. of Compost centres examined	Average volume per ton of compost
1. Ajmer-Merwara						4	Cu. ft. 40·19
2. Mysore	••		• •	••		6	40.35
3. Central Provinces &	Berar	••				13	42.81
4. Madras	• •			••		6	42.15
5. Travancore			••			6	42.93

The above data give an over all average of 41.7 cu. ft. per ton of urban compost. To adopt a round figure, it would therefore appear that the factor of 40-cubic feet equals 1 ton, is likely to give a more accurate estimate of the weight of compost prepared and distributed in the Province or State than the old factor of 50 cu. ft. equals 1 ton. The revised factor of 40 cu ft equals 1 ton applies however, only to urban compost, as prepared under existing conditions in India and does not apply to village or farm refuse compost, which are likely to contain less earthy impurities and as such to be lighter and to possess a higher volume factor. An estimate of the factor applicable in the above cases is under examination and a report will be published in these columns in due course.

#### APPENDIX A

By Dr.C. N. Acharya NOTE ON COMPOST DEVELOPMENT IN INDIA, 1944-49.

#### I.—Introduction.

The process of Compost-making is very old and was being followed though in a crude and empirical manner, for thousands of years past in China, Japan and other countries. Even today, countries like China and Japan lead others in the quantity of Compost manure prepared and applied to land, as shown by the following figures for Japan for the year 1946:

Table I.—Comparison of Japan and India in manure production

Particulars		Japan		India
1. No. of cattle and horses		4.5 millions		200 millions.
2. Area under cultivation		14.44 million acres		200 million acres.
3. Cattle (including horses) per a of cultivated area	acre	0.32	- 1	1.0
4. Total quantity of cattle-shed rural compost prepared	and	62·8 million tons		220 million tons.
5. Quantity of manure per acre cultivated area	of 	4·4 tons		l ton.
6. Quantity of plant nutrients add in the manure—	ded		!	
.Nitrogen		52·3 lb. per acre		8 lb. per acre.
P <sub>2</sub> 0 <sub>5</sub>		20.4 lb. per acre		3 lb. per acre.
K <sub>2</sub> 0		44.8 lb. per acre		7 lb. per acre.

A recent report prepared by Mr. B. R. Sen who visited Japan on behalf of the F.A.O. in 1948 states that "Among the various farm manures used by the Japanese farmers, Compost is the most important source of plant food. In 1946, it supplied 47% of the total nitrogen, 66% of the total phosphoric acid and 64% of the total potash applied to the soils of Japan. During the same year night-soil supplied 16%, 8% and 10%."

It is well known that crop yields in China and Japan are much higher than those in India as shown by the following figures:

TABLE II.

Comparison of Crop yields in different Countries (from Statistical year book of the League of Nations 1933-34 Tables 19-47)

		•				Crop yields i	n_lbs. per a	cre.
		Countr	y		Wheat	Rice (Paddy)	Maize	Cotton
Egypt	••	• •	• •		1918	2998	1891	535
Germany		••	• •	• •	2017		2228	••
Italy		••	••	••	1383	4568	2079	170
Japan		••	••	••	1713	3444	1392	196
U.S.A.		••	• •		812	2185	1579	268
China		••	• •		989	2433	1284	204
India	••	••			660	1240	803	89

The importance of compost manure in Japanese and Chinese agriculture was brought to the lime light as a result of the valuable book entitled "Farmers of Forty Centuries -Agriculture in China, Japan and Korea" which was published by F.H. King, of the U.S. Department of Agriculture in 1909, after a personal visit he paid to the above countries.

During the first world war of 1914-1918, England was faced with acute food shortage and her scientists at Rothamsted, principally Russell and Richards, developed the Adeo Process for converting straw and other farm wastes into manure by the addition of suitable chemicals. At about the same time, Waksman and his associates carried out considerable work on the subject in the U.S.A. The work of Russell and Richards attracted considerable attention in India and investigations were started at Bangalore (by Dr. G. J. Fowler), at Indore (by Sir Albert Howard) and at other centres like Coimbatore and Dacca, and processes were evolved for composting town and farm wastes into manure.

The above processes were tried out on the large scale during the period 1926-30, when it became evident that agricultural conditions in India were quite different from those in England and America and more akin to those in China and Japan, and as such our processes if they are to be adopted on the large scale by our farmers in India should be simplified and made cheaper to suit Indian conditions.

Accordingly the Indian Council of Agricultural Research took upfurther investigations on the subject at the Indian Institute of Science, Bangalore and entrusted Dr. C. N. Acharya, who had undergone training in Compost Research under Russell and Richards at Rothamsted, with the problem of working out processes that would be successful under Indian conditions.

#### II.—THE BANGALORE PROCESS OF COMOPST MAKING

During the period 1936 10, the Bangalore Process of Compost making was accordingly evolved and techniques were worked out for dealing with (a) Urban refuse like town katchia, sewage, night-soil etc., (b) village refuse like cattle-shed litte, dung, urine, house-sweepings, leaf fall etc., and (c) special types of waste material available in certain areas like sugarcane trash, forest leaves, water hyacinth etc. The new processes consist briefly of packing trenches or pits with alternate layers of refuse and nitrogenous starter (sewage, night soil, slaughter house waste, urine soaked refuse, dung etc.) according, to certain definite proportions and covering the trench with a layer of earth at the top. In the case of village refuse, an improved method of sectional filling of trenches and simple methods for conserving cattle urine have been worked out.

The above processes were given a good trial on a semi-large scale in Bombay Province during 1941-42 and found to be quite suitable for Indian conditions.

#### III.-LARGE SCALE DEVELOPMENT IN INDIA

Soon after the Bengal Famine, 1943, the Government of India decided that the Bangalore Process of Compost making should be tried out on the large scale in all provinces and States and gave a special grant of Rs. 2-1/4 lakhs to the LCAR, for initiating work in all areas. Dr. C. N. Acharya, who was appeared Chief Biochemist in charge of the Scheme, conducted from August, 1943 to June 1944 a special training course for a batch of Gazetted Officers (Provincial Biochemists and Compost Development Officers) from different Provinces and States, in the theoretical, practical and organizational aspects of Compost production. In August 1945, the Ministry of Agriculture, Government of India, took over direct supervision of the Compost Schemes from the LCAR, and invited all Provincial Governments to submit plans for large scale Compost production from urban and rural waste material in their respective areas and offered to meet half the expenditure involved on such Schemes.

Under the Town Refuse Composting Scheme, each Province is given a staff of one Provincial Biochemist or Compost Development Officer and a number of Assistants and Compost Mistries for the purpose of training the sanitary staff of municipalities in the Bangalore Process of Composting

urban refuse. In the case of municipalities in weak financial position, subsidies are offered for digging trenches and starting Compost production. The manure is generally ready in 4 to 6 months time after the trenches are filled up and the Agricultural Department give necessary help to the municipalities by way of propaganda, transport facilities etc. for distributing the manure produced to the surrounding villagers.

The progress of work during the last 5 years under the Urban Compost Scheme is shown in Table III.

Table III .- Development of Town Refuse Compost Schemes.

			Tons	Tons
		260	182,610	51,290
		411	282,670	179,919
• •		678	409,860	289,170
		566	486,080	380,527
	.,	686	708,094	502,913
	••		411 678 566	260     182,610         411     282,670         578     409,860         566     486,080

<sup>\*</sup> The dats for 1947-48 and 1948-49 refer to the Indian Union area after partition.

The details of production and distribution in different areas of the country are shown in Table IV.

TABLE IV .- Production and distribution of Town Compost in different areas.

No.	Name of the Provi	nce or St	atc.	No. of centres in operation.	Quantity of Compost prepared during the year 1948-49.	Quantity of Compost distributed during the year 1948-49.
***************************************					Tons	Tons
1	1 Ajmer-Merwara			4	3,976	2,289
9	Baroda State			14	7.973	2,223
3	Bhar			22	18,077	13,124
4	Bombay		.,	74	119,953	50,237
5	, C. P & Berar .			94	61,864	42,626
6	Cochin State			6	2,108	2,798
7	East Punjab			8	49,310	19,190
8	Dellin			4	14,797	14,797
9	Hyderalad State			35	3,967	4,841
10	Madhya Bharat		į	26	13,998	9,299
11	Madris			93	112,980	104,168
12	Mysore State .		. [	76	29,049	15,747
13	Orissa .			8	4,670	1,418
14	Travancore State			14	7,771	7,462
15	United Previews			183	241,678	205,667
16	West Bengal		••	25	12,920	7,027
				686	708,094	502,913

There are in all about 4,000 towns in India and by full utilization of the whole of the refuse material available in the above area, it is estimated that nearly 100 lakhs tons of Compost manure could be prepared—as against the present production of about 7 lakhs tons. With a view to examining the reasons for the slow progress of the work, the Government of India appointed in March 1948, a special Committee known as the Central Manure (Compost) Development Committee, which met at Nagpur in July, 1948 and at Jaipur in December 1948 and made a number of recommendations for accelerating the pace of Compost production, including one for amendment of the Municipal Act in all Provinces and States so as to give power to Government to compel municipalities to convert their refuse into manure for sale to agriculturists. The C.M.C.D. Committee at their Jaipur meeting (December 1948) also fixed certain targets so as to double the existing level of manure production during 1949-50 which have been modified in consultation with Provinces as follows:—

TABLE V.—Targets for 1949-50.

		Provinc	e or State	».			Production target for 1949-50.
1. Ajmer-Merwara	• •	• •	• •	• •		••	Tons 9,000
2. Assam		••		••	••		1,000
3. Bihar			•		••		40,000
4. Bombay	••	• •	.,	• •	••		150,000
5. C. P. & Berar			••	••	••		90,000
6. Delhi		. •	••	••	.,		30,000
7. East Punjab			••	••	• •		50,000
8. Hyderabad State			••	••	••		10,000
9. Madyabharat				••	••		30,000
10. Madras		••	••		••		150,000
11. Mysore State	••	••	••	••	••		50,000
12. Orissa		••	••	••	••		10,000
3. Rajasthan Union		••	••	• •	••	]	10,000
14. Travancore—Coc	hin Unic	on	••	••	••		20,000
5. United Provinces		••	••	••	••		400,000
6. West Bongal	••	••	••	••	••		50,000
							11,00,000

The farmers in most areas have now become convinced of the value of urban compost and any prejudice they might have had in the past against manure prepared from town refuse and night-soil is rapidly disappearing when they find that the Compost has no bad smell and resembles their cow-dung manure in appearance and properties. Experimental trials carried out in different Provinces and States, both on Government Farms as well as on the cultivators' lands have shown that in areas of assured water supply town compost has given even better results than cowdung manure, on account of its richness in phosphoric acid (cowdung manure contains about 0.7-0.8% nitrogen and 0.3% phosphoric acid on the dry basis whereas town compost contains 1.0-1.2% nitrogen and about 1% phosphoric acid). An application of 5 cartloads (2-1/2 tons) of town compost per acre has given increased yields averaging about 2 to 3 mds. of foodgrains and 5 to 10 mds. of potatoes, vegetables, etc. Farmers are paying upto Rs. 7 to 8 per ton of town compost manure (including transport charges) indicating that the manure must be worth about Rs. 10-15 per ton in terms of extra crop production.

In view of the heavy demand for manure in all parts of the country, there is good scope for even exceeding the production targets fixed in Table V for 1949-50 if certain organisational difficulties are overcome e.g. (a) the lethargy and indifference shown by municipalities in converting their refuse into manure, should be overcome by suitable amendment of the Municipal Act so as to give power to Government to compel municipalities to convert the whole of their refuse into manure; (b) the financial difficulties experienced by certain municipalities in acquiring land for Compost Depots or purchasing carts or motor trucks for refuse collection or Compost preparation, should be overcome by Government granting interest free loan for the above purpose—to be recovered from the sale of Compost manure; (c) absence of cheap distribution arrangements for manure should be overcome by Government providing special motor trucks for manure distribution on a no-profit-no-loss basis; railway wagons should also be provided wherever necessary for long distance transport

#### IV.—Utilisation of Sewage Water and Sludge.

Much attention has not been devoted so far to the question of utilisation of sewage and sludge, of which increasing quantities are produced from year to year, but at present are mostly going to waste. It is estimated that in the 25 to 30 big cities, where the sewage system has been introduced though partially, there are produced daily about 500 million gallons of sewage, which contain about 100 tons of nitrogen per day, equivalent to about 182,500 tons of ammonium sulphate valued at over Rs. 5 crores per year. The above 500 million gallons of effluent can irrigate about 100,000 acres and increase food production by about 100,000 tons. At present nearly 90% of the sewage is allowed to flow waste into nallas, rivers or into sea. Sewage effluent contains both water and plant

food and could be utilised for growing food crops, under suitable control of crop rotation and dose of sewage applied. The experience of sewage farms that have been in successful operation for several decades past at Poona, Ahmedabad, Madura, Hyderabad (DN), Delhi etc. has shown that sewage effluent could be utilised for crop production on hygienic lines without producing nuisance or danger to health, if the crop rotation and dosage of sewage be properly controlled.

Quite recently an officer with considerable experience of sewage farming (Dr. R. P. Talati) has been appointed as Assistant Compost Development Officer (Sewage Utilisation) and he has already visited a number of centres like Madras, Ahmedabad, Surat, Calcutta etc. and prepared concrete schemes for utilising the sewage available at the above centres.

#### V.—RURAL COMPOST SCHEMES.

Major attention and effort have so far been concentrated on the urban Compost schemes since the organisational part of the above work is simpler and the results of extra manure production could be more easily verified. But the vast bulk of our refuse is misused mostly in our villages and farms, where they are either not systematically collected or are used for other purposes than manure preparation e.g. burnt as fuel. The following statement will give an indication of the total quantity of refuse available in our villages and the amount at present converted into manure,

TABLE VI.-Wastage of Manure in our villages.

	Marie Paris de Caración de			Dry matter (All figures	Nitrogen	Phosphoric scid.	Potash year).
1. Total quantity million cattle in		ted by 150					
Dung				133	1 · 659	0.664	0.995
Urine	٠,			26.5	3.319	0 020	4 · 979
Waste litter			•	34.8	0.187	0.056	0.286
Tot	al per ;	year	• •	194 · 3	5.165	0.740	6 · 260
2. Recovered in manure prepare			s of	120.0	0 <sub>.</sub> 84	0.36	0 · 72

It would appear from the data given above that the wastage of plane food voided by the animals is greatest in the case of nitrogen and potash, and this is due to the defective methods of manure preparation adopted at present in the villages which do not utilise cattle urine as much as possible. As a result, the manure prepared at present in our villages contains only about 0.5-0.7% nitrogen, about 0.3% P205 and 0.6-0.7% K20 (on the dry basis) whereas similar manure prepared in China, Japan, Europe and America contains from 2.0 to 2.5% nitrogen, about 1.0% P205 and 1.0 to 1.5% K20 (on the dry basis). If the manure prepared in our villages could be raised to the above level, it would add an extra 1.5 million tons of nitrogen, 3 lakh tons of P205 and one million tons of K20 to our soils, which could increase our food production by about 10 million tons per year.

On the initiative of the Government of India, almost all the Provinces have started schemes for increasing manure production in villages and improving its quality by adopting the Compost system. The number, of villages cooperating in the scheme and the quantity of manure prepared, during 1948-49 are shown in Table VII.

TABLE VII.—Compost production under the Village Compost Schemes 1948-49

		Provine	e,		,	No. of villages.	Quantity of compost produced.
						oguranguman <u>ggurahma</u> n v	Tons
1. Bombay			• •			3,952	343,285
2. Coorg		••	••			242	44,564
3. East Punjab		••		••		314	45,050
4. Madras				• •		5,838	43,514
5. Orissa			• •	. •		2,016	256,841
6. United Provi	inces					20,881	19,36,663
7. West Bengal						10,082	95,997
						43,355	27,65,944

It would be seen from the data presented in Table VII that the extra manure produced under the scheme amounts to about 64 tons per village, representing about 20% extra production on the present level per village.

In order to check the accuracy of the extra production figures reported from the large number of villages operating the Compost scheme, Government of India have recommended to Provinces the carrying out of random surveys of villages on a statistical basis.

A survey carried out on the above lines of 75 villages selected in random in the centrally administered area of Ajmer-Merwara showed that the total average quantity of manure prepared per village worked out to 968 cartloads (each cartload about 20 cu. ft. or 10 maunds) equivalent to about 350 tons per village. There was a significant correlation between the number of cattle maintained and the quantity of manure prepared, the average coming to about 45 cu. ft. of manure per head of cattle.

When the Reports from other Provinces and States come in, it would be possible to work out estimates for (a) the average production of manure per village; (b) the average production of manure per head of cattle and (c) the total quantity of manure prepared, for each area and for the Indian Union area as a whole.

The Sample Surveys are carried out by the existing District Staff of the Provincial Agricultural Departments and since the work is light, it can be combined with the normal touring work of the officers concerned. The surveys are best carried out in the period April-June each year.

The data obtained from the above sample surveys would prove useful (a) to determine the extent to which cowdung and other refuse are used for other purposes than manure preparation e.g. burnt for fuel or not collected at all, and (b) to ascertain the increase in manure production brought about in villages as a result of the compost drive. They would also provide a valuable yard-stick for fixing definite targets of increased manure production for each area and for the award of prizes for the best performances.

#### VII.—TREE PLANTING-FOR-FUEL CAMPAIGN.

It is well known that a good proportion of cowdung estimated at about 40%-60% of the total quantity produced, which should properly go to the land as manure in order to maintain its fertility and provide sufficient food for the country, is at present misused as fuel, due to acute fuel scarcity in several areas. On the occasion of the Freedom Day Celebrations on the 15th August 1948 the Hon'ble Shri Jairamdas Daulatram, Minister for Food and Agriculture, Government of India, issued a special Appeal to all the Provincial and State Governments to organize Tree Planting for fuel Campaigns in their respective areas. In pursuance of this Appeal, which was widely broadcasted through the radio, newspapers, special handbills in local languages etc., a widespread campaign for tree planting was carried out in all Provinces and States and top ranking politicians and statesmen, including H. E. the Governor General and

several Governors of Povinces took the lead in carrying out tree planting ceremonies. Full details of the above Celebrations are to be found in the Compost Bulletins for March and June 1949, but a summary showing the number of seedlings and seeds planted in the major areas is shown below:—

Table VIII.—Tree Planting Campaign.

	Provi	nces and	l States				No. of trees planted.
. Madras Province—							
Seedlings							11,34,61
Stumps or cuttings							93,22
Secds (Numbers)							2,87,245
(Plus)			•••			• •	(7,960 1/2-lb.
Dombon Doomings		••		• • •			7,50,000
Timitad Danis		• •			••		7,50,000
East Dunial		•••			• • •		1,03,960
. Contral Provinces and			••	••			87.180
Dolhi		• •	••	• •	••	•••	50,000
Raroda	•	• •	••	• •	• •	••	10,000
. Daroda	•	••	••	••	• •	• • •	10,000
							32,66,21

In addition to the above tree planting work in village surroundings the Provincial Forest Departments have opened fuel plantations in selected blocks of land for the purpose of supplying fuel to villagers at concession rates, as follows:—

Bombay—						- 1	
						- 1	Acre
Surat District		• •	• •	• •		•• }	34
Sholapur District							66
Satara District							40
Belgaum		••					1,24
Ladras Province		•••	••	• • •	••		20,26
Punjab Province	••		•••	•••			4,52
Bengal Province							70
Soorg Province	••	• •	••	• •	••		2
Morg Province	• •	• •	• •	• •	• •		- 4
							28,17

#### VIII.—GENERAL

### Programme for 1949-50.

Recently the Government of India have decided that imports of food into India should be stopped from the end of 1951, since this is causing a huge drain on the country's financial assets abroad. A special merit of the Compost programme is that it offers the means by which the country's food production could be increased by mobilizing the internal resources

of the country, without having to depend on other countries for supplying machinery etc. In fact, every 100,000 tons of additional compost prepared in the country means about Rs. 10 lakks deduction in the food stuffs needed to be imported from abroad. The money spent by Government in organising Compost production remains in the Country itself and as such forms no drain on the country's foreign assets. The money so far spent by Government in organising Compost production has yielded fruitful results as shown in Table IX.

TABLE IX.—Showing the expenditure on Compost Schemes.

			Quantity	of compost pre	pared	ı
Year		Grants made by Govern- ment of India for compost	From town refuse.	From village refuse	Total	Estimated value of . extra food production.
1		schemes.	3	4	5	6
		Rs.	Tons.	Tons.	Tons.	Rs.
1944-45		4,92,300	182,610	210,000	392,610	39 lakhs.
1945-46		4,88,532	282,670	520,000	802,670	80 lakha.
1946-47	••	9,26,697	409,360	1 829,000	1,238,360	1 · 24 crores.
1947-48		8,15,395	486,080	1,258,986	1,745,068	1.75 crores.
1948-49		11,00,916	708,094	27,65,944	34,74,038	3.74 erores,
Total		38,23,840	20,68,814	55,83,930	76,52,744	7.65 erores.

The data given in Table IX show that the expenditure on Compost Schemes is repaid 20 times by extra food production. The target during 1949-50 should be to double the existing level of production under the urban and village compost schemes, viz. to raise the total compost production to a level of about 60 lakh tons per year, which would give us an extra food production of about Rs. 6 crores. For this, it is necessary that (a) legislation should be introduced in all Provinces and States giving power to Government to compel municipalities to convert their refuse into compost for sale to agriculturists; (b) expanded schemes of manure production should be drawn up for each area and (c) a sum of about Rs. 20 lakhs should be earmerked for compost development—it being understood that Provinces and States would contribute from their funds an equal amount for the above schemes.

### APPENDIX B

#### IMPROVEMENT OF INDIAN AGRICULTURE.

EXTRACTS FROM THE REPORT OF DR. J. A. VOELCKER TO THE GOVERNMENT OF INDIA SUBMITTED IN 1893.

I. The Indian Cultivator.—The Indian cultivator shows by the money which he is willing to pay for manure when able to afford it, that he is by no means ignorant of its value. When he burns the cow-dung which he collects, he does it as a rule, rather from necessity than from want of knowledge of its worth. That, when he has manure, he often does not preserve it well, or use it to best advantage, is, however, the result of ignorance.

I would go further and say that the best cultivators do not burn dung except out of sheer necessity, and because they have nothing else for fuel, and that even among second rate cultivators, a great majority will not burn dung if they can help it.

I have no hesitation whatever in saying that amongst cultivators the reason why they burn dung is that they have no wood; and that if wood could be made cheap and accessible to them there would be an enormous increase in the amount of manure available for the soil.

- II. Utilization of Urban Refuse. I regard the spread of a good system of utilizing human and household refuse, street sweepings etc., on the land, as a most potent factor in the improvement of Indian agriculture, and having had, among other duties, to enquire into different schemes for town sanitation. I must record my conviction that the dry system is the one best suitable to Indian circumstances and that any system which diverts from its proper destination, the land, that which has originally come from it, would be attended by loss to the cultivators and to the State, and would not be satisfactory from a sanitary point of view.
- III. Conservation of Cattle Manure.—The second point in which the cultivator does not make full use of what he has had at hand is in the conservation of the ordinary manure from cattle. Excellent as in many respects his cultivation is, yet in his method of securing to advantage the droppings of his cattle, the raiyat is, I am sure greatly at fault. This is in fact, one of the comparatively few matters which lie close to hand in which he can be shown a better way. Perhaps in no respect has the British farmer of recent years advanced so much as in the economy introduced by the proper making of farmyard manure. The superiority of box-made manure to that of open yards needs no explanation here; the advantage of recovering in the manure the cake which has been fed to

beasts is fully admitted, as also the folly of allowing the urine to go to waste. But in India it, is quite different; no litter is supplied to the cattle, and not once in a thousand times is any attempt made to save the urine. The solid excrements are picked up and either made at once into cakes for burning, or else they are thrown on the manure heap, such as it is. The urine sinks into the ground, generally into the hollows worked out by animals' feet. Now and again a little of the softened earth is scraped away and thrown on the manure heap, but it results in little more than a deeper hollow being made and serves to expose a fresh surface for the urine to sink into. The value of the urine is, I am sure not only fully appreciated, but is actually unknown to a very large number of the cultivators. Did they know its value, they might do something more to save it.

ANALYSIS OF URINE FROM INDIAN BULLOCKS AND ENGLISH COWS.

						Urine of Bullocks (Indian).	Cows ' urine (English).
						1	2
Water and evapors	able matt	ers				90.62	91.50
**Solid residue	••	••	••	••		9.38	8.50
					-	100.00	100.00
**Including miners	al matter	(ash) +	1.74+co	ntaining-	_		
**Including miners	al matter	(ash) +	1.74+00	ntaining-		0.01	
				-	- 1	0·01 0·08	
Sand Lime	• •	••	••	••			
Sand Lime Magnesia	••	••		•••	:-	0.08	1.60
Sand Lime Magnesia Potash			••	••	·· · ·	0·08 0·57 0·643	} 1.60
Sand Lime Magnesia Potash Soda	••				·· · ·	0·08 0·57 0·643 0·02	}
Sand Lime Magnesia Potash	    acid		••	••	·· · ·	0·08 0·57 0·643	}

Comparing the two analysis of urine, the Indian sample is not inferior to the English and contains even more nitrogen. Urine contains the greater part of the potash of the total voidings; and even though I do not know the average quantity of urine yielded by cattle in India, it has been found in England that the total amount of nitrogen voided in the urine is from 3 to 4 times the quantity contained in the solid excrements. Seeing, therefore, that the urine of animals is richer in fertilizing matters than the solid excrements, the loss involved by letting the urine go to waste must be very large. The answer generally given by cultivators when I asked them why no litter was used was:—"We have not enough fodder for our cattle. How shall we give them any litter." And yet this is not a real answer, for when I turned to the manure heap, I almost invariably

found in it stalks and straw and leaves, all of which would have done to use as litter. These stalks were thrown in any how; so too the solid manure; but there was no attempt to make really good farm yard manure out of it or to let the dung, as it fermented, break down and decompose the stalks and straw and form a uniform mass. Each material was left to itself—the stalks to remain as they were, hard and desiceated, the manure to get dry and to lose part of its value by exposure to the fierce sun during the hot season, or to the heavy rain in the wet season. Had these stalks, straw etc., been put under the cattle and been trampled down by them, it would have made a more uniform material and one which would have all rotted together afterwards and formed good farmyard manure. I do not say there is abundance of material for litter in all cases, but there is certainly a great deal that might be utilized. Leaves, for instance, though collected for parching grain, are neglected for litter. Again, if loose earth were sprinkled on the floor, to make up the deficiency of litter, and if this were to be periodically removed, much of the urine could be collected. Waste and coarse grass, shrubs, weeds, leaves and rubbish of almost any kind would serve for the purpose, and I have often thought that if I could but spread the so-called manure heap under the cattle again, I could double its value.

Where the cattle are better cared for, earth-nut, gingelly-cake, grain and other foods having high manurial values are given to them frequently, but it is not borne in mind that with these more concentrated foods, it is only about 1/10th of the nitrogenous and mineral constituents of the foods that actually goes on to the body of the animal and repairs its waste, but that nearly 9/10ths remain in the solid and liquid droppings. It is the knowledge of the fact which has made English farmers careful to preserve the manure of cake-fed cattle and to keep their stock in covered yards instead of in the open.

Another frequent source of loss is that the manure is often put, not in pits, but in loose heaps, into which sun and rain can easily penetrate. Even if pits occur, they are often not much more than holes dug in the ground. If the bottom of the pit were well rammed down and the sides beaten firmly or where possible plastered over with clay and allowed to harden, much loss would be saved. The manure once in the pit should be turned over occasionally, even in India, so as to get the drier portions mixed with the moister, and to make the mass rot evenly together. When the rains come, there is no difficulty in covering the pits with earth, and if the manure were well made and less like the contents of a rubbish heap, less space would be taken up, and it would well repay to cover it with earth as suggested.

1V. Need of Indian Soils for manure.—Whilst a few soils, such as those of silt-renewed tracts, the black cotton soil, and newly reclaimed or wirgin land, may not require manure, it may be said of the greater part of

India that the necessity for using manure is enormous and the supply of it is notoriously inadequate. Water and manure are interdependent, and just as the former has been and is still being provided for, so must attention be given to the supply of manure. These two factors, water and manure, constitute the raivats' great needs and in their supply coasists, very largely, the improvement of Indian agriculture. It has been shown in the chapter that, under existing circumstances, the manurial supplies in use are not sufficient to replace the crops that are taken off the land; further that the increasing tendency to export both crops and manures must cause a deterioration of the soil.

Mr. Nicholson has pointed, out that in times of serious drought manured land is able to yield at least something, or even a moderate crop, whilst unmanured land may produce absolutely nothing. The existence of some crop instead of total failure, may make all the difference between famine and no famine.

V. Sources of Manure. In considering the various sources of manure it has been pointed out that, with the exception of cattle-manure, the amount and use of the others is most limited.

Practically, therefore, everything centres in cattle-manure and the question of how to use it to better advantage.

There are two main causes which prevent manure from being properly utilised. The first, is that it is burnt as fuel because there is a deficient supply of wood; the second is, that it is not properly made, in as much as the urine is altogether wasted, and the manure is badly kept. The second of these two causes may be gradually removed by the spread of agricultural instruction, and by the example of Government Farms and Estates. The first cause, however is, one that cannot be removed except by the taking of bold measures by Government, such as those taken in introducing canals and in corrying them throughout the country. Government cannot directly provide manure for the land, but what they can do is to provide wood to take the place of cowdung as fuel, and so to liberate the latter for its proper use upon the land. In short, Government must now turn to supplying wood for agricultural purposes, just as they have supplied and are supplying water.

VI. Solution for the Manurial Problem—supply of fuel.—The one way in which alone this question of paramount importance can be met is by supplying more wood and thus setting free the manure for use on land. I shall deal in the next chapter with the exact way in which wood might be supplied, but I may say here that it is in this connection mainly that I advocated the establishment of "Fuel and Fodder Reserves".

To adopt the method followed in my earlier chapters, of summarizing possible improvements in agriculture—it has been seen that considerable difference exists in agricultural practice according as the facilities for

manure supply are greater or less. Improvement in agriculture will take place through the modefication of these differences. This cannot be effected directly by the people to any great extent, although here and there as with the kachhi cultivation, example will tell. Government will be able to assist in the work by the spread of agricultural education. Education will have a powerful influence in breaking down prejudices, and by it, the better practices and their advantages will be made known.

But the work of Government does not stop here; positive measures too must be taken. First and foremost, Government must supply wood for agricultural purposes, to take the place of the cowdung at present burnt. The Agricultural Department must, by means of an organized system of agricultural enquiry, ascertain the manurial facilities and needs of each part of the country; they must acquaint themselves with the practice of the best parts, and transfer it, when possible to others; they must ascertain and demonstrate at Experimental Farms the value of various manures, and in special the benefit of littering cattle, and the better preservation of manure.

## APPENDIX C

## THE EAST PUNJAB CONSERVATION OF MANURE ORDINANCE 1949

## East Punjab Ordinance No. XV of 1949

(Published in the East Punjab Gazette Estracidinary issue dated 27th July 1949)

#### AN

#### ORDINANCE

To provide for the conservation of manusc in East Punjah

WHEREAS the East Punjab Legislature is not in session and the Governor is satisfied that encumstances exist which render it necessary for him to take immedite action.

Now Therefore, in exercise of the powers conferred on him by subsection (I) of section SS of the Government of It did Act. 1955 as adapted by the India (Provisional Constitution) Order, 1947 the Government of East Punjab a pleased to make and promagate the following Ordinarce namely -

- 1. Short title, extent and commencement (1) This Ordinance may be called the East Punjab Conservation of Manure Ordinance 1949
  - (2) It extends to the whole of the Province of East Pumpils
- (3) It shall come into force in uch are und or such dates as the Provincial Government may by notification appoint in this b half, and different dates may be appointed for different areas of the Province
- 2. Interpretation In this Ordinance, nuless there is anything repugnant in the subject or context,
  - (a) Committee' means the Manuse Conscivation Committee set up or deemed to have been set up under the provisions of section 5,
  - (h) complaint "has the same meaning as in section 4 of the Code of Criminal Procedure, 1898 V of 1898,
  - (c) 'conservation of manure' means the collection of manure in a pit or pits of the prescribed dimensions, and its subjection to the prescribed process for the purpose of enriching the soil by its use thereon.
  - (d) 'Director means the Director of Agriculture East Properties.

- (a) "family" means a collective body of persons living in one house under one head or management;
- "(f) Government " means the Provincial Government;
- (y) "head of the family" means a person in charge of a family.
- (h) "manure" means and includes animal droppings, refuse, house-sweepings, ashes, uneaten fodder, residue, filth or rubbish of any kind, but does not include mineral fertilizers;
- (i) "notified area" means an area notified by Government under section 3,
- (1) "panchayat" means a panchayat established under section 6 of the Punjab Village Panchayat Act, 1939, (XI of 1939).
- (k) "prescribed" means prescribed by rules made under this Act.
- 3 Power to notify certain areas. The Government may by notification declare any area constituted within the limits of any one Tebsil to be a notified area for the purpose of this Ordinance, and may by notification after the boundaries of any area so declared.
- 4. Liability of occupier or head of a family in a notified area. (1) The occupier of any building on a notified area, or, if more than one person occupy a building in such ar a, the head of the family residing in such building, shall conserve manure, or arrange for its conservation, in the prescribed manner and to the prescribed extent.
- (2) If the occupier, or, as the case may be, the head of the family responsible for conservation of minure, is not in possession of land for such purpose, he shall within one month of the formation of a Committee for the cream which here sides submit a written application to the Committee to provide him in such area with land necessary for the aforesaid purpose.
- 5. Formation of Committees (1) The Panchayat for any notified area shall be the Manure Conservation Committee for such area and its power under this Ordinance shall be in addition to its powers conferred under the Punjab Village Panchayat Act. 1939, (XI of 1939).
- (2) If no Panchayat has been con tituted for any notified area, the Director shall by notification establish for such area the Manuie Conservation Committee appointing thereto such number of persons, not less than three and not more than seven as he may from time to time fix in this behalf.
- (3) A Committee shall, subject to such rules as may be prescribed, be competent to acquire, hold or transfer property moveable or immoveable; to enter into contracts and to do all other things necessary for the purpose of this Ordinance

- 6. Chairman of Committee.—(1) The Chairman of any Committee deemed to be such under sub-section (1) of section 5 shall be the Sarpanch of the Panchayat.
- (2) The Chairman of a Committee established under sub-section (2) of section 5-shall be the person appointed as such by the Director from among the mambers of the Committee.
- (3) The Chairman shall be the Chief Executive Officer of the Committee and shall be responsible for the due maintenance of all records or registers which may be prescribed.
- 7. Funds—(1) There shall be a fund vested in each Committee which hall be utilized by the Committee to meet charges in connection with its duties under this Old nance.
- (2) All grants from the Governm noor local hod; s and all sums recove ed by or on behalf of the Committee under this Ordinance or otherw a shell be credited to the aforesaid fund.
- 8. Committee to take steps for acquiring land..-(1) On receiving any application made to it under sub-section (2) of section 4 the Committee shall take all steps necessary for providing to the applicant the area of land required by him.
- (2) If the Committee is unable to provide the land required by the applicant, it shall within one month of the application apply to the Government for the acquisition of the necessary area of land within the notified area.
- 9. Acquisition of land by Government.—(1) The acquisition of land by Government in pursuance of an application made to it by any Committee shall be a public purpose within the meaning of the said term in the Land Acquisition Act, 1894, (I of 1884).
- (2) Any land acquired by Government in pursuance of the application made to it by a Committee shall be transferred to such Committee on such terms and conditions as may be prescribed, or as the Government may see fit to impose in any particular case.
- 10. Power of Committee to charge rents.—The Committee may charge rents not exceeding the prescribed scale for the site or sites it provides for conservation of manure to any person who has made application to it under sub-section (2) of section 4.
- 11. Power of entry.—Any member of a Committee or any officer of the Department of Agriculture not below the rank of Agricultural Assistant, shall be empowered to enter upon any land or premises within the jurisdiction of such member or officer, as the case may be, for the purpose of ascertaining whether or not manure is being conserved in such land or premises.

- be conserve manure in the manner or to the extent required under subsection (1) of section 4, the Committee may by notice in writing specifying a reasonable period require him to conserve manure in the prescribed manner or to the prescribed extent.
- (2) If any work required to be done under subsection (1) is not executed within the period of the notice, the Committee may itself equae such work to be executed and recover a sum not exceeding the cost there; of from the person notified.
- 13. Penalty for disobedience.—Any person who disobeys a notice issued by the Committee under section 12 shall on conviction by the Committee be punished with fine which may extend to twenty-five rupees, and if the breach is a continuing breach, with a further fine which may extend to four rupees for every day after the first during which the breach continues.
- 14. Supervision of proceedings of the Committee by the Director.—(1) The Director may of his own motion or on application of the party aggrieved call for the records of any proceedings whereby any person has been convicted by the Committee under section 13, and may cancel or modify any order or conviction but not so as to enhance the penalty.
  - (2) A fee of rupee one shall be paid on every such application.
- 15. Finality of orders of the Committee.—Subject to an order made by the Director under section 14, the order of a Committee under section 13 shall be final and shall not be liable to be called in question by any court or other authority.
- 16. Procedure, if the Committee does not issue notice.—If in any case a Committee fails within a reasonable period of the default to issue notice under sub-section (1) of section 12, any officer of the Department of Agriculture not below the rank of Agricultural Assistant may issue such notice. If the notice is not complied with he shall have the powers of a Committee under sub-section (2) of that section.
- 17. Proceedings on disobedience of notice issued under the last preceding section.—If any person disobeys a notice issued under the last preceding section the officer who issued the notice may make a complaint to the nearest Magistrate having jurisdiction who shall thereupon exercise all the powers of a Committee under section 13.
- 18. No legal practitioner to appear before Committee.—Notwithstanding anything contained in the Legal Practitioners Act, 1879 (XVIII of 1879) no legal practitioner shall be permitted to appear before the Committee for any party in any proceedings under this Ordinance.

- 19. Delegation.—The Director may by written order delegate his functions under this Ordinance by name or by designation of office to any officer of the Department of Agriculture not below the rank of Agricultural Assistant.
- 20. Recovery of dues as arrears of land revenue.—Any sums due under this Ordinance may on application to the Collector be recovered as if they were arrears of land revenue.
- 21. Bar to suits or legal proceeding.—No suit, prosecution or other legal proceeding shall lie in respect of anything in good faith done or intended to be done under this Ordinance or the rules made thereunder.
- 22. The provisions of the Punjab Village Panchayat Act, 1939, (XI of 1939) specified in the Schedule to this Ordinance shall, so far as may be, apply to the proceedings of Committees, the powers to be exercised by them and the duties to be performed by them under this Ordinance, and their suspension or abolition.
- 23. Power of Government to make rules.—(1) Government may make rules for carrying into effect the purposes of this Ordinance.
- (2) In particular and without prejudice to the generality of the foregoing power Government may make rules regulating—
  - (a) the size of pits for the conservation of manure, the processes to which it is to be subjected and the extent to which it is to be conserved:
  - (b) the appointment, suspension and removal of members of Committees;
  - (c) the functions and powers and the appointment, suspension and removal of Chairman of Committee;
  - (d) the powers of a Committee to sue and to acquire, hold or transfer property and to enter into contracts;
  - (e) the records and registers to be maintained by Committees and their custody and proper maintenance;
  - (f) the custody and proper maintenance of the funds of Committees;
  - (g) the terms and conditions on which land may be transferred by Government to Committees;
  - (h) the scale of rents to be charged by Committees for sites provided by them for conservation of manure;
  - (i) the conduct of business at meetings of Committees and the quorum for such meetings;
  - (j) the punishment, suspension and dismissal of servants of Committees:

- (k) the manner in which summons issued by Committees are to be signed and sealed; and
- (1) any other matter in respect of which rules are expressly required or allowed by this Ordinance to be made.

## SCHEDULE

Sections 11, 12 (2), 17, 18-33-34-36 (3)-38, 60, 61, 64

SIMLA.

C. M. TRIVEDI,--

The 20th July, 1949

Governor of the East Punjab.

S. B. CAPOOR,

icretary to Government, East Punjat, Legislative Department.

# APPENDIX D

EAST PUNJAB ORDINANCE No. XIX OF 1949.

THE PUNJAB MUNICIPAL (EAST PUNJAB AMENDMENT)
ORDINANCE, 1949.

(Published in the East Punjab Gazette, Extraordinary Issue dated 24th August, 1949).

An Ordinance to amend the Punjab Municipal Act, 1911, in its application to East Punjab.

Whereas the East Punjab Legislature is not in session and the Governor is satisfied that circumstances exist which render it necessary for him to take immediate action;

Now, THEREFORE, in exercise of the powers conferred on him by subsection (1) of section 88 of the Government of India Act, 1935, as adapted by the India (Provisional Constitution) Order, 1947, the Governor of East Punjab is pleased to make and promulgate the following Ordinance namely:—

- 1. Short title.—This Ordinance may be called the Punjab Municipal (East Punjab Amendment) Ordinance 1949.
- 2. Amendment section 3 of Punjab Act III of 1911.—In section 3 of the Punjab Municipal Act (hereafter referred to as the said Act) the following new clauses shall be added, namely:—
  - "(19)" dung" for the purposes of sections 154-A and 154-B shall include night-soil, sewage, sullage, sludge, refuse, filth or rubbish or animal matter of any kind;
    - (20) "compost manure" means the produce prepared from dung by subjecting it to the process of compost making in the manner prescribed by rules."
- 3. Amendment of section 52 of Punjab Act III of 1911.—In clause (a) of sub-section (2) of section 52 of the said Act after the word "watercourses" the following words shall be inserted, namely:—
  - " and the preparation of compost manure."
- 4. Insertion of new section 154-A. 154-B 154-C and 154-D, we Punjab Act III of 1911.— After section 154 of the said Act the following new sections shall be inserted, namely:—
  - "154-A. Preparation of compost manure.— Where the Provincial Government so requires it shall be the duty of the Committee to subject all dung to the process of making compost manure.

- "154-B. Power to acquire, etc.— Where the property in any dung vests in any person or class of persons other than the Committee, the Committee, required under the last preceding section, shall acquire, either premanently or for such period as it may deem fit, the rights or interests in the dung belonging to the aforesaid persons, on payment of such compensation as the Committee may consider reasonable and may assess in the manner prescribed.
- 154-C. Right of appeal and revision.—(1) any person aggrieved by an order passed by the Committee under section 154-B may, within thirty days from the date of the communication to him of the order prefer an appeal in writing to the Deputy Commissioner of the district wherein the Committee is situated:—
- Provided where the Deputy Commissioner is himself a member of the Committee against whose decision the appeal has been preferred, the fact of his being a member shall not disqualify him from hearing the appeal.
- (2) The Deputy Commissioner shall decide the appeal after sending for the records of the cases from the Committee and after giving the parties an opportunity of being heard and, if necessary, after making such further enquiry as he thinks fit either personally or through an officer subordinate to him.
- (3) A further appeal shall lie to the Commissioner of the Division provided that when the order of the Committee is confirmed by the Deputy Commissioner no such appeal shall lie.
- (4) The Provincial Government or the Commissioner may, at any time, call for the record of any case pending before or disposed of by the Deputy Commissioner:
- Provided that this power shall not be exercised by Commissioner when an appeal has been preferred to him under sub-section (3);
- Provided further that the Provincial Government or the Commissioner as the case may be, shall not under this subsection pass an order revising or modifying an order affecting any person without giving such person an opportunity of being heard:
- Provided further that if the Provincial Government takes action under this subsection it shall not be competent for the Commissioner to do so.
  - 154-D. Jurisdiction of civil courts barred.—Not withstanding any thing contained in any other law for the time being in force, no civil court shall have jurisdiction to entertain or adjudicate in any suit, application or other proceedings relating to the

interest to or in the compensation referred to in Sections ,154-B, or 154-C or the amount or appartionment or the payment, hereof or any matter connected therewith."

- 5. Amendment of section 240 of Punjab Act III of 1911.—To subsection (1) of Section 240 of the said Act the following new clauses shall be added, namely:—
  - " (2322) mode of assessment, apportionment of compensation under section 154-B amongst and payment to the persons entitled thereto:
    - (22222) mode of communication of the order under section 154-B to the person affected thereby:

(seezzz) the manner in which the compost is to be made."

the bid till

C. M. TRIVELI,

SIMLA;

Governor of East Punjab.

The 23rd August, 1949.

S. B. CAPOOR,

Secretary to Government of East Punjab, Legislative Department.

# COMPOST BULLETIN

# (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

Issued by the Compost Development Officer, Ministry of Agriculture, Government of India

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This Bulletin is intended for the information of officers engaged in operating Compost Schemes, in order to keep them posted with the latest scientific and practical developments taking place in their field, in India and abroad. It must be understood, however, that the views expressed in this Bulletin are not binding on the Government of India.

## COMPOST BULLETIN

# 1. Compost Development in other countries.

A short note describing the action taken by the Government of Costa Rica in forming a "State Corporation of Organic Manures" for the purpose of fully utilizing the urban and rural waste material available in their area, has already appeared in the June 1949 (Vol. 2, No. 2) issue of this Bulletin Reports received from other countries show that considerable weight is now being accorded in all countries to the question of developing in full the indigenous resources of manure production and also to the need for adding enough organic manure to the soil in order to maintain, on a long term basis, a high level of crop production.

A 'Humic Compost Society' has been formed in New Zealand, with branches at 14 centres, which is carrying out considerable propaganda in New Zealand and Australia and is publishing a "Compost Magazine" (P. O. Box 15W, Auckland, C. I. New Zealand). The Royal Commission which was recently set up to examine the Sheep Farming Industry in New Zealand devoted considerable attention to the importance of Compost manure. After reviewing the Compost work carried out by the Dannevirke Municipal Council, the Commission expressed the view: — "We think the matter has gone beyond the inquiry stage. There can be no doubting the nation's need. We must increase the fertility of our land or perish. We consider that all organic wastes should be used for this purpose ultimately. We think, therefore, that all local authorities should be encouraged and assisted by the Government to reclaim all such wastes and process them into Compost for the agricultural industries".

In the U. S. A., a Soil and Health Foundation has been established for the purpose of financing scientific investigations on the relation between the composition of the soil, the type of manuring and the quality of crops raised (Address: 46 S. West St., Allentown, Pennsylvania, U. S. A.). Two excellent monthly journals viz. "Organic Gardening" and the "Organic Farmer" (Emmaus, Pa, U. S. A.) are issued by Mr. J. I. Rodale, who forms the pivot

of much enthusiastic work on Compost carried out in America. His books on "Pay Dirt" and the "Healthy Hunzas" have proved best sellers both in America and abroad. "Organic Gardening Clubs" have been organized at Oakland (California), Chicago (Illinois), Fort Worth and Houston (Texas), Midland (Ontaria, Canada), and Lakewood (Ohio).

In England, the untiring and dynamic propaganda carried out by the late Sir Albert Howard, based on the results of his observations accumulated during a long period of service in India are well known. He had a happy knack of arousing and maintaining enthusiasm among his co-workers. His books on the subject like "An Agricultural Testament" and "Farming and Gardening for Health and Disease" have become world famous. In addition to his numerous articles and papers on the subject, he was publishing a Journal "Soil and Health". During his lifetime, the Soil Association was formed (May 1946) with Lord Teviot as President and Lady Eve Balfour as Organizing Secretary (New Bells Farm, Haughley Suffolk) and is doing useful work by carrying out special scientific investigations and crop trials at their Research Station in New Bells Farm in Suffolk. The Association is also running a special quarterly Magazine known as "Mother Earth".

After Sir Albert's death in 1947, a special Foundation known as the Albert Howard Foundation of Organic Husbandry was formed to follow up his work. (Address: Sharnden Manor, Mayfield, Sussex, England). This Foundation is publishing the Journal "Health and the Soil" and has also brought out a number of useful publications, including one on the utilization of sewage and town refuse.

The Union of South Africa started composting of town wastes during War time and appointed a Special Officer (Mr. J. P. J. van Vuran) to organize Compost production at their municipal centres. It is estimated that the 252 urban centres in South Africa could produce nearly 1 million tons of manure per year. In addition to Government efforts, a number of private agencies have also sprung up to prepare Compost from municipal refuse and sell the same to farmers. A recent report

states "It would appear that the composting of urban wastes is now well established and that it has come to stay. The major point outstanding is to find the most economic agency for conducting composting".

As is well known, Composting has been a regular agricultural practice for thousands of years past in China and Japan, where the density of population would not permit any wastage of manure. In 1946, Compost and nightsoil contributed 58·1 per cent of the nitrogen, 70·1 per cent of the phosphate and 72 per cent of the potash applied to soils in Japan. Nearly 4 to 5 tons of Compost are prepared per acre under cultivation, as compared to about a ton per acre in India, though the number of cattle per acre in Japan is only about a third of the number in India.

Those who would like to have fuller information of Compost activities in other countries may take advantage of the Bibliography given in Appendix C.

# 2. Bombay's Drive for increased Manure Production.

The Bombay Government have introduced legislation for compulsory composting of urban refuse by munici-In the matter of village refuse composting, they have recently sanctioned a large scheme at a cost of Rs. 35 lakhs to cover the period 1st October 1949 to 29th February 1952. Under this Scheme, it is proposed to take up all the 30,000 villages at the rate of 10,000 villages per year, for the purpose of intensive propaganda and practical demonstration of the improved methods of manure prewith special reference to urine conservation and sectional filling of trenches. The target aimed at is to increase the production of village manure from the present level of 100 lakh tons (at an average rate of 1 ton per head of cattle per year) to 150 lakh tons and raise the quality of the manure from the present level of 0.7-0.8 per cent nitrogen to a level of 1.5 per cent nitrogen by better conservation of cattle urine. If the targets are achieved, it would mean the production of 50 lakh tons of additional manure, and the addition of an extra 50,000 tons of nitrogen to the soil, equivalent to 500,000 tons of extra food production.

The huge task of organizing 30,000 villages in the matter of better and increased manure production can only be done with the active co-operation and organised work of the villagers themselves. For this purpose, the Bombay Government have constituted Village Food Production Committees, at each centre, consisting of (i) the Talati, under whose jurisdiction the village falls; (ii) the Patil (iii) the village primary school teacher; (iv) a representative of the Village Panchayat and (v) not more representatives of the cultivators of the village, to be nominated by the Mamlatdar. The Talati will act as Secretary of the Committee and carry out the Village Grow More Food Drive under the supervision of the Mamlatdar, who is also Chairman of the Taluka Rural Development Board and has been entrusted with the work of organizing the Grow More Food Campaign in the In villages where multipurpose co-operative societies exist, the latter may be constituted into Village Food Production Committees.

The Honourable Premier and Honourable Minister for Agriculture of Bombay Province have also issued Appeals for honorary workers to come forward to organize the Grow More Food Drive in villages, under the auspices of the Taluk and District Rural Development Boards. Such voluntary workers have been asked to concentrate on the following items of work: -(1) Digging of pits for tree planting and planting of trees. (2) Digging of compost pits. (3) Cleaning of the villages and utilizing the refuse for composting. (4) Helping the cultivators in agricultural operations which do not require technical skill, during rush periods. (5) Desilting of tanks, construction of bandharas, etc.

In their all-out effort to make the Province self-contained in foodstuffs, the Bombay Government have also directed the Home Guards Organisation throughout the Province to co-operate in carrying out the Grow More Food Campaign, especially in respect of the following items of work:—(i) Tree Planting (by digging pits in the villages, planting trees and protecting them from cattle); (ii) Curbing the nuisance of stray cattle by assisting villagers in impounding them; (iii) Keeping general cleanliness of the village by actual physical work and composting the refuse collected; (iv) Helping the

villagers in repairing small irrigation tanks, especially in respect of desilting and (v) Helping the villagers to destroy wild animals, such as tigers, wild pigs, deer and blue bulls (Neel Gai).

In order further to arouse popular enthusiasm in the Grow More Food Campaign, the Bombay Government organised a "Gram Sudhar Saptah" (Village Improvement Week) throughout the Province for seven days from the 2nd October 1949 (Mahatma Gandhi Jayanti) to the 8th October, 1949. During the week special attention was paid to items connected with the Grow More Food Campaign, with special reference to (a) digging of compost pits in the villages; (b) cleaning the villages and using the refuse for composting; and (c) collecting leaves and other green matter, from the village surroundings and nearby forests for purpose of manure preparation; (d) carrying out demonstrations of the improved method of farmyard manure preparation, with special reference to the utilisation of cattle urine and the re-arrangement of the existing heaps and pits so as to produce richer manure.

Saptah included meetings, flag salutations, Prabhat Pheris, and actual demonstrations of compost making. Commenting on the success of the celebrations, the Hon. Minister for Agriculture, Bombay Province says: "Reports received by the Government of Bombay regarding the observation of the Gram Sudhar Saptah show that the necessary atmosphere for the enthusiastic participation of cultivators in the "Grow More Food" Campaign has now been created due to the exhortations of our leaders and the willingness of our cultivators to have trust in their advice. The main programme during the week was compost-making, and literally thousands of manure pits were dug all over the Province. vators were not alone in this work, but were joined by large number of officials and non-official workers, particularly home-guards, boy-scouts, teachers, students and volunteers from urban areas. I am glad to note the work done during the Saptah and wish to convey my own as well as Government's appreciation of the work done. I wish to convey by means of this statement my sincer thanks to all those who responded so selflessly to the call for work and achieved such good results."

# 3. Mahatma Gandhi Jayanti as a Grow More Food Week.

Thanks to the Special Appeal issued by the Hon. Shri Jairamdas Daulatram, Minister for Food and Agriculture to the Government of India, in July 1948, the Independence Day Celebrations each year on August 15th have come to be closely associated with a programme of extensive tree planting all over the country, aimed at increasing our fuel supply and saving nearly 200 million tons of valuable cowdung manure from being burnt every year. In a similar manner, Mahatma Gandhi Jayanti, commemorating the birth day anniversary of the great Saint and liberator of India, which falls on October 2nd, bids fair to become a Gram Sudhar Week, specially intended for Village improvement. It is well known that the economic, social and cultural uplift of the villagers was the desire nearest to Mahatmaji's heart. "The salvation of India ", he declared " lies in her cottages ".

The considerable success which attended the Gram Sudhar Saptah celebrations in Bombay Province as described in the previous section would warrant the extension of the programme to the whole of India during the next Mahatma Gandhi Jayanti in October 1950. The above proposal is supported by the opinions expressed by our National Leaders supporting the Bombay Programme as given below:—

Acharya Vinobha Bhare:—" In order to give an impetus to the work of compost making, it is a good idea to observe a week on the occasion of the Gandhi Jayanti. What more shameful thing can there be than India importing food from abroad. If we could utilise all the resources of production, India would feed even double her present population. What Indian agriculture requires can be obtained in the best form from compost. It is necessary, therefore, to educate the public in the various processes of compost-making."

Hon. Pandit Jawaharlal Nehru:—"I am glad to learn that Bombay is observing a 'Grow More Food Week' at the time of the Gandhi Jayanti. That is the best way to pay homage to the memory of the Father of the Nation.

- "It is necessary that our official and non-official organisations should realise the great importance and urgency of this problem. This is not a slogan or a mere matter for resolutions, but something that demands hard work and results. It is by results that every one will be judged.
- "In particular, I would appeal to the cultivators to throw themselves into this great task which affects them more than others. They are the backbone of the Nation and it is on their progress that the progress of the Nation depends."
- Hon. Shri B. G. Kher:—"I wholeheartedly support the idea of devoting the Gram Sudhar Saptah this year entirely to the intensification of the food production drive. It is in the fitness of things that we, who are in the midst of food crisis should consider increasing the production of food as the most important item of improvement of the rural areas, till the food problem is solved. I understand that it has been decided to concentrate the Saptah programme on the production of manure from waste, green matter, village refuse, cattle urine and dung and nightsoil. From these waste products food will be produced. Our villages will be cleaner and healthier. In addition to giving more food, this programme will enable the villagers to live a healthier life.
- "I appeal to all to observe the Saptah with enthusiasm and full vigour."
- Shri R. K. Patil. Food Commissioner to Government of India: "I am glad that a Gram Sudhar Saptah is being observed in the Bombay Province in connection with the Mahatma Gandhi Jayanti and that it is proposed to concentrate this year on Grow More Food Schemes, particularly the preparation of compost, the method of preparation of farmyard manure and intensive cultivation.
  - "I very much welcome the idea.
- "Gram Sudhar Saptahs help to remind us of our duties to rural areas. In fact, one reason why the villages are backward today is that the best amongst them, who were capable of leading them to a better status, have forsaken them for the towns. This has robbed them of a natural advantage, which they had a right to count upon. If the

results of this have to be combated in a full measure, it can only be possible through a real band of social workers who would fully realise this and try to make amends. What the nation needs today is more food.

- "Manuring is of great importance in good cultivation, but today we are losing good manure in many different ways. All rank vegetation which grows round about our villages in the rainy season should be composted and utilised as manure. Secondly, we practically lose all the cattle urine. As urine contains a larger percentage of nitrogen than cowdung, the importance of this source of manure is greater than cowdung.
  - "Then there is cowdung and human excreta also.
- "We take grain from the soil, but unless we return to the soil what we have taken from it, the soil is bound to be poorer.
- "If we can utilise all these resources, not only shall we not need any imports of cereals, but we would have an abundance of them.
- "We must also provide in villages a system of latrines so that our womenfolk would be able to use them without being disturbed by passers-by.
- "All this will improve our sanitation and our culture.
- "I hope that some of these things will be done during the Gram Sudhar Saptah.".

The Hon. Shri M. P. Patil: "For the second year in succession, the Gram Sudhar Saptah will be observed in our Province.

- "Last year, the programme related to many aspects of rural development and incidentally also to increasing food production. There was, then, the urgency of solving the food problem, but no deadline had been laid down before which the problem was to be solved.
- "But this year, we have before us the deadline set by the Government of India to attain self-sufficiency in food by the end of 1951.

"The Government, has therefore, decided that until the food problem is solved, *i.e.*, during 1950 and 1951, the Gram Sudhar Saptah should be devoted entirely to the promotion of the Grow More Food drive.

"During the Saptah, the main plank of work should be increasing production of organic manures like farmyard manure, compost and nightsoil. Our soils are poor in nitrogen and organic matter and it is no exaggeration to say that if all the available resources of producing organic manure are fully tapped, our production would increase so substantially that we will have broken the back of the enemy, viz., food deficit, in this Food War, and only mopping up operations will remain to be carried out.

"In each village the programme for the Saptah is to be carried out by the Village Food Production Committee. On the 2nd October the Saptah should be inaugurated by holding a general meeting, Prabhat Pheri, flag salutation etc. in each village. The importance and urgency of stepping up food production and the various concessions offered by the Government in this regard should be explained to the cultivators. On the first day itself the proper method of preparing compost manure and preparing good farmyard manure should be explained. Actual demonstration of the methods advocated should be held simultaneously, if possible. If not, the demonstration should be held as early as possible during the Saptah. There is plenty of useless and even harmful green matter growing in the villages at this time of the year. It should be cut and collected for compost-making. are forests nearby the supply of suitable green matter Even elsewhere, weeds and shrubs. would be abundant. which prevent the growth of good grass for grazing would give enough quantities of green matter and if this is removed it will have a beneficial effect on the grazing Suitable material for being used as bedding grounds also. for cattle should also be collected during the day. the evening, the cattle sheds should be covered with this material. On every morning during the Saptah compost pits should be dug and village refuse collected and filled in the pits together with the cattle bedding soaked with urine and the green matter cut and collected. At the end of the Saptah, the villages should look clean and tidy and all villagers should have learnt the proper methods of compost-making and preparing farmyard manure. Whereever, possible, schemes for trench latrines should be worked out during the Saptah. The members of the Village Food Production Committees and primary school teachers and village officers should personally inspect the work done by the villagers every morning and should themselves set an example to the doubters by doing the work for them.

"Careful cultivation, if practised universally, will also make a very substantial contribution to the country's food bowl. The principal item in cultivation, which is often neglected, is weeding. Communal weeding by villagers will be very useful. Women, who cannot undertake heavy manual labour like digging compost pits, can do this important work during the Saptah.

"This year the Gram Sudhar Saptah should be devoted to physical work for increasing food production. Preaching and propaganda must now give place to getting busy with the actual job.

"I appeal to all, particularly the villagers, to observe the Gram Sudhar Saptah by the sweat of their brow."

## 4. Grow More Food Conference at De'hi

A Special Conference of Provincial Food Production Directors and Secretaries to Provincial Governments was held at Delhi on 28th-30th November, 1949, in order to finalise the plans for achieving food self-sufficiency by the end of 1951. The Conference was opened by the Hon. Prime Minister, who in his opening speech reaffirmed the decision of Government not to import any foodgrains from abroad from 1952 and urged provincial representatives to make an all-out effort to achieve food self-sufficiency before the target date fixed.

The Conference considered in detail the major items of the Grow More Fool Campaign including the urban and rural compost programme. The Conference recommended that composting of urban refuse should be undertaken in all municipalities and the Provinces might consider granting financial assistance to such municipalities which were not in a position to undertake the work without such assistance. It was however pointed out that proper disposal of nightsoil and other town refuse was a primary

function of a municipality and every municipality should undertake this work. The Conference was in favour of introducing legislation to compel municipalities to dispose of their refuse collection through the process of compost making. As regards the transport of ripe compost from the municipal dumps to rural areas, the Conference recommended that where special trucks were not available to the municipalities, lorries and other transport belonging to Civil Supplies, Agriculture or other Government Departments might be made available for the purpose.

It was also announced that a new film on Compost making would be shortly prepared by the Government of India, copies of which in different languages would be made available to Provinces for purpose of intensive propaganda.

In concluding the proceedings of the Conference, the Food Production Commissioner to the Government of India, Shri R. K. Patil, observed:—"If we succeed in our task, future historians will regard the names of us as having been associated with a memorable event in India's economic history, namely, wiping out food imports which have been a regular feature in this country for the last 20 to 25 years."

# 5. Reconstitution of the Central Manure (Compost) Development Committee.

The Government of India appointed in March 1948 a standing Committee known as the Central (Compost) Development Committee for the purpose of reviewing the progress of Compost Development in the country from time to time and making recommendations to Government on the steps to be taken to secure utilization of the urban and rural waste material for increasing food production. The Committee held two meetings, the first at Nagpur in July, 1948 and the December, 1948, and made a Jaipur in number of important recommendations, including one for introduction of legislation to compel municipalities to convert the whole of their refuse collection into manure and another for estimating the present level of manure production in the villages by the method of random sampling. At the Jaipur meeting, the Committee

also fixed certain tentative targets of Compost production for different areas during 1949-50.

In order to strengthen the hands of this Committee and enable it to carry out its recommendations in the Provinces and States, the Government of India have re-constituted the above Committee with effect from 15th October 1949 as follows:—

The following shall be the members of the Committee in place of the members notified in the Gazette of India dated 20th March, 1948.

- 1. Shri R. K. Patil, Commissioner for Food Production, Government of India (Chairman).
- 2. Shri S. Y. Krishnaswamy, Joint Secretary, Ministry, of Agriculture, Government of India.
- 3. Chaudhuri Mukhtar Singh, Vigyan Kala Bhawan, Meerut.
- 4. Shri Satish Chandra Das Gupta, Khadi Prathisthan, Sodepur, Calcutta.
- 5. Inspector General of Forests, Ministry of Agriculture, Government of India.
- 6. Dr. J. N. Mukarjee, Director, Indian Agricultural Research Institute, New Delhi.
- 7. Shri R. L. Sathi, Agricultural Commissioner, Indian Council of Agricultural Research, New Delhi.
- 8-23. Directors of Agriculture of the following Provinces and States: (i) East Punjab, (ii) United Provinces, (iii) Bihar, (iv) West Bengal, (r) Assam, (vi) Ocissa, (rii) Central Provinces & Berar, (viii) Madras, (ix) Bombay, (x) Travancore & Cochin Union, (xi) Mysore State, (xii) Hyderabad Government, (xiii) Saurashtra Union, (xiv) Rajasthan Union, (xv) Madhyabharat Union, (xvi) Patiala and East Punjab States Union.
- 24-29. Agricultural Officers in Ajmer-Merwara, Coorg, Bhopal, Delhi, Himachal Pradesh, Vindhya Pradesh.
- 30. Land Development Commissioner, Delhi.
- 31. Compost Development Officer to Government of India, (Convenor).

The above Committee shall meet once every six months in order to carry out the work outlined in the Government of India, Ministry of Agriculture Resolution dated 18th March, 1948, but in order to facilitate the execution of the above work, the Committee will be assisted by an Executive Committee consisting of (1) Shri R. K. Patil, (2) Shri S. Y. Krishnaswamy, (3) Chaudhuri Mukhtar Singh (4) Shri Satish Chandra Das Gupta, (5) Inspector General of Forests, (6) Dr. J. N. Mukerjee, (7) Shri R. L. Sethi, (8) Sardar Datar Singh, (9) Dr. C. N. Acharya (Convenor).

In supersession of para, 2 of Resolution dated 18th March 1948, the above Committee will function for a period of 3 years from 15th October, 1949.

# 6. Compost Development in Orissa.

After the merger of a number of adjoining States, Orissa has become a major province and its potentialities for agricultural production have correspondingly increased In the matter of Compost Development, Orissa is making rapid headway and bids fair to beat other provinces of bigger size. The Compost Development Officer to the Government of India toured round the Province September, 1949 and examined the work proceeding at the urban and village Compost centres. The Orissa Government have in consultation with him framed a gramme for rapid expansion of compost production in both the urban and rural areas. They have recently introduced legislation for amending their Municipal Act so as to compel municipalities to convert the whole of their refuse material into compost manure. The above legislation has now become law and with its help, targets of increased manure production have been fixed for municipalities so as to raise the total production from 4,711 tons during 1948-49 to 11,380 tons during the current year. are, however, 33 towns in the 12 districts of Orissa and these can produce in all about 40,000 to 50,000 tons manure per year. A scheme has been prepared under which motor trucks would be purchased and operated for purpose of compost distribution at the urban centres.

Orissa is also operating a Village Compost Scheme under which a target of 400,000 tons of manure was originally aimed at during 1949-50. In view of the 6 additional

districts which have been added, the programme of work in this direction has been enlarged, so as to cover the new areas and to increase the over-all production to a level of  $6\frac{1}{2}$  lakh tons during 1949-50. There is plenty of green vegetation round about villages and it should be possible to reach the above target of extra manure production.

A special feature of Orissa is the large area it possesses under Forest and there is no reason why her villagers should burn cowdung for fuel. Personal examination, however, of a number of villages showed that about 40-50% of the cowdung is at present being used, for fuel. If a suitable organization could be set up to supply cheap fuel to villagers and to persuade them to apply the whole of their cowdung manure to land it would be possible to increase food production in Orissa by about 25 per cent.

Enquiries made at several villages in Orissa showed that an application of 5 cardoads of manure (2 tons) gave an increased yield of 2 to 3 maunds of paddy. This would work out to a crop value of about Rs. 5/- per cartload of manure (10 maunds or 25 cu.ft.). 10 maunds of manure is derived from about 15-16 maunds of fresh cowdung which is equivalent for purpose of fuel to about 3 maunds, dry fuel wood. It would, therefore, be oconomic for the present price-levels of paddy. cowdung for manure preparation, if he can purchase fuel wood at a price less than Re. 1 per maund. Out of the total 50,000 villages in Orissa, about half the number may be taken to be within 15 miles distance from forest and as such it should not be difficult for a Government sponsored agency to supply fuel wood to villagers at less than Re. 1 per maund.

Detailed discussions held with villagers gathered at special meetings showed that they realise the value of cowdung manure and are willing to save the major portion of the cowdung they are now burning, if a Government sponsored agency could open Manure-cum-fuel Depots in their villages and could supply fuel wood in exchange for cowdung or for cash at a rate of Re. 1 per maund or cheaper. There are in general three groups of people in villages viz., (i) labourers and craftsmen who own no land and are not interested in manure making, and burn their cowdung

as the easiest way of disposal, or because they cannot afford to purchase fuel wood for cash; (ii) the middle classes, who own land, but do not take the trouble to take their carts to the forest area 10 or 15 miles away, either out of laziness or out of ignorance of the value of manure, but adopt the easier alternative of burning their cowdung in place of fuel; and (iii) the well to do land owners who realise the value of manure and are prepared to purchase extra manure if available and also fuel wood at cheap rates. The Manure-cum-fuel Depot could satisfy all the above three groups of people, by purchasing the cowdung from the landless workers, in exchange for fuel wood (say at a rate of 4 maunds of fresh cowdung taken for every maund of dry fuel wood given, and sell the cowdung again to the land-owning people at cost price.

Probably the best agency for operating the Scheme will be the Village Panchayat or multi-purpose Cooperative Society but as the Scheme is a new one, it would be necessary for Covernment to start the work at some selected centres under the management of their Agricultural Department. After one year, when the work is proceeding smoothly, it can be handed over to the Panchayat or Cooperative Society concerned. The scheme should be carried out on a no-profit no-loss basis.

Considerable work on the composting of water hyacinth is being carried out in Orissa, especially in the districts of Balasore, Cuttack, Puri and the northern part of Ganjam District. In addition, a scheme has been started for composting forest litter, by encouraging villagers to dig pits in the forest area and fill up the same with litter twice a year.

# 7. Casuarina, the quick-growing fuel tree.

Casuarina is a tree of rapid growth which was introduced into India about 75 years ago. It is largely grown for purpose of fuel supply in the Coastal tracts of Madras Province and also in parts of Mysore State. It is the major source for supply of fuel wood to meet the needs of Madras City. Most of the Casuarina is grown on a plantation basis in sandy tracts on which nothing else will grow. The Casuarina plantations give on such extremely

poor soils a good net return of Rs. 100-120 per acre per year. The planting is done in annual blocks following a rotation of 8-10 years and the cutting is done after 8-10 years, so that a steady supply of fire wood is available each year. In addition to fire wood, the long stems supply light timber useful for posts and roofing.

The following particulars regarding the cultivation of the crop in the South Arcot and Chingleput districts of Madras Province, are taken from a report supplied by the Director of Agriculture, Madras.

## South Arcot District.

Soil.—Pure sandy areas adjoining sea coast to stiff clayey soils are used for casuarina raising. Sandy loams with water table at a depth of 4 to 6 feet in summer are best suited.

Ruising nursery.—Ripe fruits from trees 6 to 8 years old are collected and dried from January to April. The bursts scatters the seed. Dried seed is and sown in nursery within 3 to 4 months. Long strips 48 to 60 feet long and 2½ to 3 feet broad, are dug up for nursery. Nurseries are not manured. I to 14 Madras Measures of s ed is sown in each strip generally in February-March. The seedlings after 60 to 75 days are pulled and replanted in a second nursery. In 6 months from date of sowing seedlings are fit for planting. Each bed may carry about 12,000 seedlings. The seedlings are sold for Rs. 3 to 4 per 1,000.

Field planting.—The plants are usually put in at  $4\frac{1}{2}$  feet apart. Nearly 2,200 seedlings go to an acre. Usual time of planting is during North East Monsoon period. Generally no preparatory cultivation is done to fields. Small pits 9 inches in depth are formed and soil loosened. Making hole with stick, seedlings are planted.

Watering. - The plants are watered both morning and evening for first 10 days; ones daily for succeeding 10 days and later twice weekly, depending on rains.

Cultural operations.—Soil between rows of plants will be loosened by working a country plough in the second and third year. Trees not coming up within 4 years are removed and sold. This thinning reduces the number by 25 per cent. Finally 1,500 plants per acre will mature.

Harvest.—The trees are cut at the end of 8 to 10 years. Each tree will fetch about a rupee. The loppings of lower branches at the end of the 3rd year and plants removed while thinning, when sold generally cover watchman's charges.

Economics.—The total cost of cultivation amounts to and receipts Rs. 1,500 per acre. The profit works out to Rs. 850 per acre for a period of 8-10 years.

## CHINGLEPUT DISTRICT:

#### ECONOMICS OF CULTIVATION:

Population of o	casuarina trees per acre	1,500
Seedlings are p survives.	lanted in twos and the better of the two	
		Rs.
1st year	Cost of 3,000 seedlings at Rs. 3 per 1,000	9 0 0
Labour for p	planting (including digging small pits) 16 men at Rs. 1/4;-per man	20 0 0
Irrigation duri	ng the first year on rainless days, 2 men on the average (a Rs. 5 per man per month for 12 months	120 0 0
	Watch at Rs. 5 per month twelve months	60 0 0
2nd year	Occasional watering 13 of the previous year	40 0 0
3rd year	Severing side branches, 5 men per day at 1,4,- per man	6 4 0
	Watch for 3rd year (v Rs. 35 per month for 10 acres	42 0 0
4th -8th Year	Watch expenses for 5 years at Rs. 42 per year	210 0 0
	Assessment for 8 years at Rs. 5 per year	40 0 θ
	Total expenses	547 4 0
Receipts	50 tons at Rs. 30 per ton	1,500 0 0
	Net profit for 8 years	952 12 0
		(per acre.)

# 8. Bhopal joins the Compost Programme.

Bhopal, which is now a centrally administered area possesses considerable resources for increasing its food production. In addition to plenty of vacant land, there is considerable scope for increasing manure production in the rural and urban areas. The Compost Development Officer to the Government of India visited the area towards the end of October 1949 and examined the present position of refuse disposal in the urban and rural areas of the province. As a result of his discussions, the Bhopal Government have now sanctioned a Scheme for producing about 60,000 tons of additional manure during the current year and have appointed a Provincial Compost Development Officer, for the purpose.

There are nearly 600 Village Panchayats in the province, covering about 2,900 villages, with a human population of about 7 lakhs and a cattle population of about 8 lakhs. The present production of manure in the province is estimated at about 6 lakhs tons per year i.e., about 3/4 ton per head of cattle or on the average about 1,000 tons per Panchayat area. The local cattle are small sized, weighing about 600-700 lbs.

At a special Conference of Departmental heads that was held on 31-10-49, plans were framed for enlisting the active co-operation of the Panchayats in order to ensure a 50 per cent increase of manure production in each area during 1950-51. This would mean the production of an extra 3 lakh tons of manure in the whole province. Half of the extra production could be achieved by betta; collection of the refuse available in the villages and farms.

The conditions of manure production in Bhopal are similar to those prevailing in other areas, viz., nearly half of the cowdung is used for purpose of fuel, and the remaining portion is converted into manure in a crude and unscientific manner. If the Agricultural Department could enlist the active co-operation of the Forest Department and organize a scheme for the supply of cheap fuel wood to villagers, much of the cowdung now being burnt could be saved for fuel. The Forest Department could contribute to the Grow More Food Campaign also by permitting villagers to dig pits and prepare compost with forest litter in the forest areas themselves.

The Director of Education, Bhopel, is arranging to dig compost pits in all the village schools.

# 9. An Expert's Opinion.

An interesting extract from the Report of Dr. J. A. Voelcker to the Government of India, submitted in 1893, was presented in the September issue of Compost Bulletin (Vol. 2, No. 3). Voelcker combined his scientific experience with a deep knowledge of practical agriculture and made his recommendations which hold true even after 56 years. Another doyen of Science in practical agriculture is Dr. Harold J. Mann, who put in a long service in the Bombay Department of Agriculture and retired as Director of that Department. Even after retirement, he has chosen to remain in the saddle as Director of the Woburn Experimental Research Station at Bletchley in England for the last 15 years. The opinion of such a man who has accumulated several decades of practical experience is worth hearing. In a recent letter to Dr. Gilbert J. Fowler he says:—

"But the official line, both in England and India, is to pile in artificial manures, and that way disaster lies and it may come more quickly than most people realise I have an experiment here, now continuing for 19 years with a six-course rotation, where nothing but plenty of artificials are added; and with both barley and rye there has been a steady decline in yield (as judged by the moving average). Other crops have not shown it so well, but I do not know how soon they also will show the need for organic manures. In other direction, I am finding, in my study of clover sickness, that the loss of power in soil to produce clover is very closely connected with the organic matter, both as to quantity and kind, in the soil." (Com post Magazine, New Zealand, July-August 1949).

## 10. Utilization of Human Urine for Manurial Purposes.

In the existing schemes for composting urban refuse attention is mainly concentrated on the conservation of nightsoil and katchra (dry refuse), but almost the whole of the urine fraction goes to waste. The quantity of nitrogen voided in urine is 5 to 6 times as great as that voided in nightsoil, as shown by the following figures of analysis:—

# Quantities excreted per day

	Nightsoil gms.	Urine gms.
Quantity (natural condition)	 133 · 00	1200.00
Total dry matter	30.30	64 - 00
Nitrogen	$2 \cdot 10$	12.10
Phosphoric acid $(P_2, O_3)$ .	1 · 64	$1 \cdot 84$
Potash (K, 0)	0.73	$2 \cdot 22$

It is calculated that from a population of 350 millions we could obtain nearly 1½ million tons of nitrogen and about 300,000 tons of phosphoric acid by taking necessary steps to conserve the whole of the urine voided for manurial purposes.

In the case of cattle manure, the poor quality of manure prepared in our villages at present (0.7-0.8 per cent, nitrogen on the dry basis) has been explained as due to the failure of our villagers to conserve even one half of the urine voided by the animals while they are tied up in the cattle-shed at night time. It has been shown that by adopting simple methods of conserving cattle urine e.g., by spreading litter or even old manure in the urine-zones of the cattle-shed and by adopting improved methods of storage like sectional filling of trenches, it is possible to increase the quality of the manure prepared to a level of 2.0 to 2.5 per cent, of nitrogen (on the dry basis).

Due to a similar reason, the compost prepared from town refuse and nightsoil at most municipal centres in India at present is also poor and contains only about 0.7-0.8 per nitrogen on the fresh basis (equivalent to about 1.0 cent. of nitrogen on the drvcharges of transporting the above bulky manure upto a distance of 15 or 20 miles often amount to twice or thrice the cost of the manure itself. As a result, the sale price obtained by the municipalities is often low, when compared to other organic manures. Thus, oil-cake which contains about 6-7 per cent. nitrogen is selling at about Rs. 200 per ton, while town compost containing about 0.7-0.8 per cent. nitrogen (on the fresh basis) hardly fetches about Rs. 2 to 3 per ton.

The difficulty of higher transport charges can be overcome, at least partially, by increasing the nitrogen content of compost, so that a proportionately smaller quantity only has to be moved to supply the same quantity of nutrients. Thus if 10 tons of compost (A) containing about 0.7 per cent. nitrogen be required to fertilize an acre of potatoes, 5 tons of compost (B) would be sufficient if the latter contains 1.5 per cent. nitrogen. The transport charges would be proportionately reduced, with the result that the purchaser would be prepared to add the saving in transport to the price of the better quality manure.

If town compost manure is to hold its own against oil cakes and other organic manures in normal times, when Government subsidy may be withdrawn, attempts should now on to improve the quality of the be made from compost to a level of 1.5 per cent, nitrogen on the fresh basis (i.e., about 2.5 per cent, on the dry basis). This can be achieved by adopting a number of measures such as (a) sieving the final product before sale to remove stones, glass, tin, etc., which may raise the nitrogen percentage by 0.2-0.3 per cent, or (b) altering the relative proportions of katchra to nightsoil in compost preparation; this would involve secrificing quantity of manure obtained in favour of quality. But the best results in respect of both quantity and quality, and also the greatest income to the municipality could be obtained by introducing simple thods of urine conservation in houses by use of pits filled refuse or special containers packed with absor-The urine-concentrated refuse so obtained should be added to the compost trenches in such proportions as to raise the nitrogen percentage of the final compost to a level of 2.0 to 2.5 per cent. N (on the dry basis). Compost of such quality can after sieving, be readily sold ex-Depot at Rs. 20 to Rs. 25 per ton, since it is 1/3 as rich in plant nutrients as oilcake.

As regards villages, where 75 per cent. of our population live, it is easy to dig pits in the backyard of the houses and fill them up with refuse to serve as urinals. Even the existing manure pits can be used. If the mass of the people can be made manure-conscious and are appraised of the value of human excreta (urine and nightsoil) as manure, and if widespread facilities be afforded as in Japan and

in nightsoil, as shown by the following figures of analysis:—

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China for collection of nightsoil and urine in pits which are provided with privacy, there is no doubt that the agricultural yield per acre in India can be raised to the same level as is obtained in Japan and China and our food deficiency will soon be a matter of the past.

In the above connection, agricultural, health and educational authorities would be interested to read the simple methods of urine conservation described in Appendix "A" of the present issue. The urine-pit should be introduced into all schools and hostels and as many village homes as possible. The tin-can equipment described in Appendix "A" is suitable for crowded localities and urban homes, hotels, offices, etc.

## 11. Compost Development in Madras.

The second meeting of the Provincial Compost Development Committee, Madras, was held on 15-10-49, with the Honourable Minister for Agriculture (Honourable Shri A. B. Shetty) in the chair. The meeting considered a number of items including the supply of motor trucks for manure distribution at municipal centres and the fixation of a suitfor urban compost. On this latter point able price there was considerable discussion, in view of the wide variation in prices from centre to centre, and opinion was expressed by some members of the Committee that there should be a uniform price at all centres. After examining in detail the cost of production of compost at different centres, the Committee recommended that a uniform price of Re. 0-10-10 per cert load of 25 cu. ft. (which works out to Rs. 1-5-8 per ton) should be charged by all municipalities. At centres where the cost of production exceeded the above level, the municipality should submit their statement of expenditure to the Inspector of Municipal Councils and Local Boards (who is in charge of the Urban Compost Scheme in Madras Province), who would place the matter before Government for grant of a subsidy to cover the difference between the actual cost of production and the price fixed by Government. The above system was recommended for trial for a period of 6 months, before re-examining it.

The Madras Government have also under consideration a Scheme prepared by Dr. R. P. Talati, Assistant Compost Development Officer to Government of India, for the utilisation of 25 million gallons per day of Madars sewage for irrigating 2,500 acres and growing 2.500 tons of additional food stuffs. It is expected that the scheme will be taken up for execution shortly.

The Compost Development Officer to Government of India visited Madras on 10-12th November 1949 and after discussion with the local officers has submitted proposals for extending the existing Compost Scheme Panchayat Board areas. There are nearly 8,000 Panchayat Boards in Madras Province, possessing populations ranging from 3,000 to 20,000. A peculiarity of Madras Province is that even big units, which in other Provinces would have become municipalities, still continue to remain Boards. 360 of the Panchayat Boards Panchayat have got Executive Officers appointed by Government and possess senitary staff for collection of refuse and could undertake compost production work immediately. Panchayat Boards could also usefully carry out demonstrations of the improved methods of cattle shed manure preparation to their inhabitants, most of whom are agriculturists.

### 12. Compost Teaching in Schools.

In accordance with the recommendations of the Central Manure (Compost) Development Committee, several of the Provinces have already taken action to include compost teaching as one of the items for study in schools—both The introduction urban and rural. and of compost pits (including urine pits) in schools will serve not merely to improve the cleanliness and sanitation of the schools concerned, but would also serve as an object lesson to the villages concerned. The Village schoolmaster is in most cases the intellectual and spiritual guide of the villagers and his propaganda is likely to prove of considerable help in making the villagers realise the advantages of the improved methods of manure preparation. In Bombay the Schoolmaster has been included as a member of the Village Food Production Committee and is being utilised for purpose of propaganda under the Compost Scheme. Government have announced that teachers who distinguish themselves in this work would be awarded special certificates of merit and their names would be published in the Gazette as recognised social service workers.

In Orissa, the Village School children are setting an example to their elders by going round their villages once a week along with their masters, sweeping the roads and surroundings and converting the refuse into manure. Such an object lesson, if it is introduced into all the schools in India, will achieve wounderful results in a year or two in making the villagers manure-minded. When the children grow up, the fundamentals of village cleanliness and composting would become routine matters on which no further propagands would be necessary.

In the above connection, a Primary Lesson on Compost in Hindi, recently introduced in U. P. Schools, the text of which has been given in Appendix B, could be used with advantage in all village schools.

#### APPENDIX A

#### METHODS OF CONSERVATION OF HUMAN URINE

#### I. The Pit System:

This system is specially suited for villages and small towns, where space is available in the back-yards of the houses for the digging of one or two pits. The method is based on composting urms with household refuse. The details are as follows:—

A pit 3 ft. square and 3 ft. deep is dug at some suitable spot behind the house and is filled up with alternate layers of 6 inches thickness of dry refuse (leaf-fall, litter, house sweepings or other organic refuse) and \(\frac{1}{2}\) inch layer of earth. The above layers of refuse and earth are repeated till the pit is filled up to a level of 2 to 3 inches below ground level. The top of the refuse is then covered with a one inch layer of dry earth. One wooden plank (say 9" breadth and 5 ft. length) is placed across the pit. When the above pit is used for urination, the urine is absorbed by the successive layers of refuse and earth and there is a tendency for the bottom layers to be more wet than the upper layers. The position of the plank is changed from time to cone such that the refuse in different parts of the pit is uniformly saturated with urine. When properly used, there should be no saturation of the top leyer, no evolution of smell and no attraction to flies.

Rapid decomposition of the refuse takes place under the above conditions, attended by decreasing capacity of the humus formed to retain further additions of urine. The top layer then becomes damp and there is smell of ammonia.

At this stage, a new pit is dug along—side the old one and is filled up—with—alternate layers of refuse and earth in the manner prescribed earlier and is put under use. The first trench is covered over with an additional one—mich layer of earth and is allowed to decompose for a further period of 2 months, after which the manure can be removed—for application to land.—Analysis of the manure has shown that we could obtain a product—containing from 2 to 3 per cent of nitrogen.

#### 11. The Aure-San-Urmal.

This urinal is specially suited for urban areas, where the pit system cannot conveniently be adopted. A preliminary description of the Agro-San-Utined has already appeared in Indian Farming (December 1947 issue).

The method requires the use of a special equipment made of galvanized iron as per sketch and measurements given in Fig. 1. The equip-

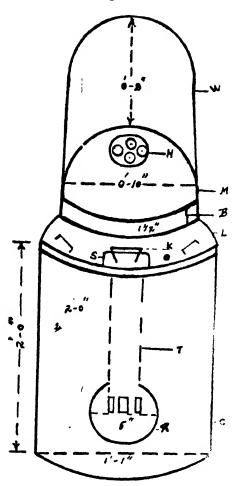
ment consists of a cylinderical can C fitted with a lid, through which passes the urinal tube T connected to a urine basin H on top. The can C is packed with an absorbant material, which may be dry soil, ash, dry dung, dry farmyard manure, saw dust, charcoal, paddy husk, dry leaves or cotton, the efficiency increasing in the order given. The urinal tube T is then fitted in such a manner that its lower end goes down almost to the bottom of the can, so that the absorbant material is soaked from the bottom. The filling of the can is carried out as follows:—

Remove the lid of the can and fill in the absorbing material to 6 inches from the bottom. Place the delivery tube inside the can to stand on the absorbing material. Fill up the can completely burying the delivery tube. The upper end of the delivery tube emerges about 3 inches above the top of the can. The lid is now fitted up through the slit S and the can is covered. The socket in the mouth of the urinal is now fitted inside the delivery tube projecting through the lid. The urinal is ready for use.

Two cans of the measurements given in the diagram would normally suffice for a family. When one can gets saturated with urine, as shown by the top layer of absorbing material appearing moist, the lid can be removed and the can may be kept in the sun to dry up, while the other can is used. Due to the presence of the absorbing material, there is very little of small produced during use of the can.

Once every month, the absorbant material in the can should be changed and the old material used as manure.

Figure 1.



C--Can made of galvanized iron, which may be painted with acid proof paint. This is filled with one of the absorbing materials.

Height 2 ft. Diameter 1 ft-1"

- L Lid of the can.
- 8 Slit in the can lid 3" broad and 4" long for the delivery tube to pass.
- T Delivery tube 2" diameter 2 ft. length.
- R --Circular disc stand attached to delivery tube 5" diameter.

- M- Mouth of the urinal lase dian.eters 10 inches.
- H.—Hole through which urine passes into the delivery tule, Diemeter 2" covered with a perforated disc.
- K—Socket arrangement for the mouth of the urinal fitting inside the delivery tabe.
- W\_Wall of the mouth of urinal,— Length 9".
- P—Circular band on the base—width  $l\frac{1}{2}$  inches.

#### APPENDIX B

Primary Lasson on "Compost"

The following lesson on "Compost" has been introduced into text books for elementary schools in the Unite Provinces. Other provinces may prepare lessons in their local languages on similar lines.

## भिस्सी खाद

मा बच्चो ! तुम प्रति दिन भोजन करते हो, पर क्या तृपो कभी सोचा है कि तुम्हारे भोजन का सामान जैसे गेहूं, चावल, मक्का, दाल, शक्कर, इत्यादि कहां से और कैसे पैदा होता है। या इनके पैदा होने के लिए किन-किन चीजों की आवश्यकता पड़ती है। आओ ! आज हम लोग इस गहन विषय पर विचार करें जिस पर प्राणिमात्र का जीवन निर्मर है।

तुमने अनाज के बीजों को तो देवा ही होगा। ये कितने छोटे होते हैं। पर भूमि में पड़ते ही इननें से जड़ं, किर तने, पितवां और बाद में बालियां निकलनी हैं, जिनसे हमें तथा हमारे पगुओं को भोजन मिलता है। इनके उनने, बढ़ने तथा फूलने के लिए तीन चीजों की विपंश आवश्यकता होती है. सूर्य क प्रकाश, पानी और भूमि का रम। यदि इनमें से किसी एक की भी कनी हो जाय तो पौधों का बढ़ना कर जाय और हमें भोजन न मिले। सौभाग्यवंश हमारे देश में सूर्य के प्रकाश की कमी नहीं है। पानी भी वृष्टि द्वारा, ताल, नदी या कुओं द्वारा मिल ही जाता है। परन्तु भूमि का वह रस जिमे पौधे बराबर अपने अन्दर खींचे रहते हें पौथों के कटने के साथ ही उमकी प्राय. कनी हो जाती है। यदि इस रस को भूमि मं किर से लौटाने का साधन न हो तो इस रस का भंडार एक दिन खाली हो जाय और भूमि की उर्बरा शक्ति धीरे-धीरे नष्ट हो जाय। तुमने मुना होगा कि आज कल हमारे खेतों की पैदावार कम होती जा रही ह। इसका मुख्य कारण इसी रस की कनी है।

इस रस को लौटाने का एकमात्र उपाय है खेडों में खाद डालना। खाद ही भूमि का प्राण है। जिस प्रकार मनुष्य भूखा रह कर काम नहीं कर सकता उसी प्रकार भूमि भी भूखी रह कर अन्न नहीं पैदा कर सकती । चूंकि पौधे भूमि से ही रस पाकर पैदा होते हैं इसिलए इनके अन्दर वह रस संचित रहता है। यदि इन वानस्पितिक पदार्थों को जैसे घास, फूस, सखी पित्यां इत्यादि को सड़ा गला कर फिर भूमि में डाल दिया जाय तो भूमि का खोया हुआ रस फिर उसको लौट जाय और उसकी उर्बरा शिक्त कभी क्षीण न हो। मनुष्य तथा जानवर के मल मूत्र और गोबर में भी भूमि के लिए पाषक पदार्थ पाया जाता है। इन दोनों प्रकार की चीजों के मिश्रण से वैज्ञानिकों ने एक पूण खाद तैयार की है जिसे मिस्सी खाद या कम्पोस्ट कहते हैं। अनुभव द्वारा पना चला है कि इसके प्रयोग से भूमि की उर्बरा शिक्त डेड़ गुनी से लेकर दुगुनी नक बड़ जाती है। बड़े-बड़े विद्वानों का मत है कि इसी खाद में कृपि की सकलता का बीज है। इसीलिए कई प्रान्तों में इसे सोना खाद भी कहते हैं

परन्तु यह अत्यन्त ही दुख़ की बात है कि हमारे देश के किसान गोबर के गुण को जानते हुए भी इसे इकट्ठा करने में तथा इसके सहारे घास फूस को सड़ाकर खाद बनाने में बहुत असावधानी दिखलाते हैं। गोबर तो अधिकतर वे जलाने के ही काम में लाते हैं और इसी के साथ साथ भूमि की उर्बरा शिवत भी जला देते हैं। जरा सोचो तो यह कितनी बड़ी भूल है कि जिससे हमें भोजन मिले और जो हमारे जीवन के प्रश्न को हल करे उसी की ओर से हम इस प्रकार असावधान रहें। चीन देश का किसान इसी मिस्सी खाद के प्रयोग से एक बीघे में जितनी उपज हमारे देश में होतो है उससे तीन गुनी अधिक पैदा करता है। आओ! अब देखें कि यह मिस्सी खाद कैसे बनाई जा सकती है।

जिस प्रकार दही जमाने के लिए दूध में जामन की अवश्यकता पड़ती हैं उसी प्रकार घास पात, कूड़ा कर्कट को सड़ाने के लिए गोबर और गोमूत्र की आवश्यकता होती है। इसके लिए सार घर के अत्यन्त निकट या अन्य किसी स्थान पर जहां घर का कूड़ा-कर्कट, गोबर इत्यादि प्रतिदिन युगमता से पहुंच सके एक गहरा गड्ढा खोद लेना चाहिए। इस गड्ढे की नाप आठ फुट लम्बी, छः फुट चौड़ी और एक सिरे पर तीन फुट और दूसरे सिरे पर साढ़े तीन फुट गहरी होनी चाहिए गड्ढे को ऊंचे सिरे की तरफ से ही भरना चाहिए। पहले इस का

एक भाग भरा जाय, फिर दूसरा, फिर तीसरा जब तक कि गड्ढा पूरा न भर जाय। जिस भाग को पहले भरना हो उसमें सबसे पहले नीचे घास पात, खर पतवार की एक छः इंच मोटी तह लगा देनी चाहिए। प्रतिदिन का गोबर, गोमूत्र से सना कचरा, घर की झाड़न, राख इत्यादि डाल कर फिर घास पात और जानवर की चरही के बचे हुए भूसे से ढक देना चाहिए। प्रतिदिन का गोबर छिड़काव के ढंग से ही डालना चाहिए जिसमें पहले दिन का गोबर एक कोने मे पड़े, दूसरे दिन का उसके बगल मं, तीसरे दिन का दूसरे दिन वाले के बगल में, इत्यादि। जब गड्ढे का वह भाग पूरा भर जाय तब उसके ऊपर चार या पांच घड़ा पानी छिड़क कर मिट्टी से लिपाई कर देनी चाहिए। इसी प्रकार दूसरा और तीसरा भाग भी भरे। यह खाद अन्दर ही अन्दर आवे में मिट्टी के वर्तन की तरह पक कर पांच या छः महीनों में तैयार हो जाती है।

बरसात में जब गड्ढों के अन्दर पानी भरा रहे तब जमीन के ऊपर ही किसी ऊंचे स्थान पर खाद बनानी चाहिए। घाम पात और गोबर की बारी बारी से तह लगा कर एक सिल्ली तैयार कर लेनी चाहिए। फिर इसके ऊपर मिट्टी चढ़ा कर छोड़ देनी चाहिए। तीन या चार महीने में यह खाद अच्छी तरह तैयार हो जाती है।

गोबर की अपेक्षा गोमूत्र में लगभग चोगुना अधिक पोषण पदार्थ होता है। पर किसान इसके मूल्य को नहीं समजते। तुमने देखा होगा कि यह सार घर में किस तरह बह कर नष्ट हो जाता है। इससे कीड़े भी पैदा होते हैं जो पशुओं को कष्ट पहुंचाते हैं। इसके संचय करने के तीन ढंग हैं। (अ) सार घर में जानवर के नीचे मिट्टी बिछा देनी चाहिए और जब यह मूत्र से तर हो जाये तो इसे उठा कर खेत में डाल देनी चाहिए। (ब) जाड़े के दिनों में जानवर के नीचे घास फूस की एक बिछाली बिछा देनी चाहिए और जब यह मूत्र से तर हो जाये तब इसे खाद के गड्ढे में डाल देना चाहिए। (स) यह प्रायः देवा जाता है कि जहां जानवर बंधते हैं वहां उनके चलने से और मूत्र के बहाव से कुछ प्राकृतिक गड्ढे बन जाते हैं। इन गड्ढों को खुरपी से दस इंच चौड़ा और एक दो इंच गहरा

कर लेना चाहिए । इसके अंदर चरही का बचा हुआ भूसा या घास डाल कर मिट्टी या राख से ढक देना चाहिए । मूत्र से सने हुए इस पदार्थ को प्रतिदिन गोबर के साथ ही निकाल कर खाद के गड्ढे मे डाल देना चाहिए । फिर उसी प्रकार मूत्र गड्ढे को दूसरे दिन के लिए भर कर छोड़ देना चाहिए । यह किया बड़ी ही सरल है।

चतुर किसान वही है जो गोबर, गोमूत्र और अधिक मात्रा में वानस्पतिक पदार्थों को इकट्ठा करके उससे उत्तम कम्पोस्ट (मिस्सी) खाद बनावे। एक बड़े जानवर से एक वर्ष में लगभग साठ मन खाद तैयार हो सकती है। एक गाड़ी अर्थात् बीस मन ऐसी खाद से कम से कम एक मन अधिक अन्न पैदा होता है।

#### प्रश्न

- १. मिस्सी खाद किसे और क्यों कहने हैं?
- २. गोमूत्र क्यों संचय करना चाहिए और इसका ढंग क्या है ?
- ३. एक जानवर से एक वर्ष में कितनी खाद तैयार होगी ?
- ४. एक गाड़ी खाद से कितना अधिक अन्न पैदा होता है ?
- ५ भूमि में खाद की आवश्यकता क्यों पड़ती है?
- ६ किन किन ची जों से मिस्सी खाद बनाई जा सकती है ?
- ७ मिस्सी खाद बनाने के ढंग क्या हैं?

## आदेश

१ अग्नो भाषा में वाद की कहानी लिखो।

#### APPENDIX C

List of Books and Journals dealing with "Compost" and Organic Manures.

- 1. Alternative to Death by the Earl of Portsmouth (Faber and Faber Ltd., London).
- An Agricultural Testament by Sir Albert Howard, 1940 (Oxford University Press, London).
- 2. Biochemistry of Nitrogen Conservation by Dr. Gilbert J. Fowler 1934 (Edward, Arnold and Co., London).
- 3. Biodynamic Farming and Gardening by Ehrenfried Pfeiffer, 1943 (Rudolph Steiner Publishing Co., London).
- 4. Biodynamic Preparations by Ehrenfried Pfeiffer, 1940 (Rudolph Steiner Publishing Co., London).
- 5. Chemicals, Humus and the Soil by Donald P. Hopkins (Faber and Faber Ltd., London).
- 6. Charter of the Soil by John Drummond, 1947 (Faber and Faber, Ltd., London).
- Compost by F. H. Billington, 1942 (Faber and Faber Ltd., London).
- 8. Compost Gardener by F. C. King, 1943 (Titus, Wilson and Son Ltd., London).
- 9. Compost—how to make it by J. I. Rodale, 1943 (Rodale Press. Emmaus, Pa).
- Compost Manure from Town Wastes by C. N. Acharya (Miscellaneous Bulletin No. 60 of the I. C. A. R)., Manager, Government Publications, Civil Lines, Delhi).
- 11. Commonsense Compost-making by Maye E. Bruce, 1948 (Faber and Faber Ltd., London).
- 12. Earth Worms by T. J. Barret, 1946 (Faber and Faber Ltd., London).
- 12a. Earth's Green Carpet by Louise E. Howard (Faber and Faber Ltd., London).
- 12b. Earth's Face by Ehrenfried Pfeiffer (Faber and Faber Ltd., London).
  - 13. Deserts on the March by Paul B. Sears, 1948 (B.C.M) Biotechnic Press, London W.C.1.)
- Formers of Forty Centuries by F. H. King, 1933 (Jonathan Cape, London).
- 15. Farming and Gardening for Health or Disease by Sir Albert Howard, 1945 (Faber and Faber Ltd., London).

- 16. Fertilizers by V. Ignatieff, 1949 (Food and Agriculture Organization of the United Nations, Washington, U. S. A.).
- 17. Fertilizer Practices in Japan 1947, Report No. 93 issued by the General Head Quarters, Supreme Command for Allied Powers Tokyo.
- 18. Fifty years of Field Experiments at Woburn Experimental Station by E. J. Russell and J. A. Voelcker, 1937 (Longman Green and Co., Ltd., London).
- 19. Health of the Future by Aleck Bourne, 1948 (B.C.M. Biotechnic Press, London, W. C. 1.).
- 20. Healthy Hunzas by J. I. Rodale, 1947 [Rodale Press, Emmaus, Pa (U.S.A.)]
- Humus by S. A. Waksman, 1939 (Bailliere Tindall and Cox, London).
- 22. Humus and the Earthworm by Charles Darwin (Faber and Faber Ltd., London).
- Humus and the Farmer by Friend Sykes. 1947 (Faber and Faber Ltd., London).
- 24. Ill fares the land by Carey Mc Williams (Faber and Faber Ltd., London).
- 25. Labouring Earth by C. Alma Baker, 1940 (Heath Cranton Ltd., London).
- 26. Land now and tomorrow by R. G. Stapledon, 1935 (Faber and Faber Ltd., London).
- 27. Living Soil by E. B. Balfour, 1949 (Faber and Faber Ltd., London).
- 28. Look to the Land by Lord Northbourne, 1940 (Dent and Sons Ltd., London).
- 29. Manures by A. D. Hall. 1947 (John Murrey, London).
- 30. Microbes by the Millions by Hugh Nicol, 1939 (Penguin Publications, Hammondsworth, Middlesex, England).
- 31. Mycorrhiza by M. C. Rayner, 1927 (Cambridge University Press, Cambridge).
- 32. New Methods in Agriculture and their effects on Foodstuffs by E. Pfeiffer, 1934 (Rudolph Steiner Publishing Co., London).
- 33. Nutrition and National Health by Sir Robert McCarrison (Faber and Faber Ltd., London).
- 34. Organic Manures by S. H. Jenkins, 1935 (Tech. Commn. No. 33 of the Imperial Bureau of Soil Science, Harpenden-England).
- 35. Our plunderd Planet by Fairfield Osborn, 1940 (Faber and Faber Ltd., London).
- 36. Pay dirt by J. 1. Rodale, 1947 (Rodale Press, Emmaus, Pa, U.S.A.).
- 37. Ploughman's Folly by Edward Falkner (Michael Joseph, London).

- 37a. Ploughman's Wisdom by Norman Carew (Faber and Faber Ltd., London).
- 38. Ploughing in prejudices by Edward Faulkner (Michael Joseph, London).
- 39. Rape of the Earth by J. V. Jacks and R. O. Whyte, 1939 (Faber and Faber Ltd., London).
- 40. Reconstruction by way of the soil by G. T. Wrench, 1940 (C. W. Daniel and Co., Ltd., London).
- Road to Survival by William Vogt (Faber and Faber Ltd., London).
- 42a. Soil and Sense by Michael Graham (Faber and Faber Ltd., London).
- 43. Soil Conditions and Plant Growth by Sir E. J. Russell. 1937 (Longman Green and Co., Ltd., London).
- 43a. Soil Fertility, Renewal and Preservation by Ehrenfried Pfeiffer (Faber and Faber Ltd., London).
- 44. Soil, Humus and Health by W. S. Cooper (B. C. M. Biotechnie Press, London W.C.1).
- 45. Soil Microbiology by S. A. Waksman, 1927 [Williams and Wilkins Co. Ltd., Baltmore (U. S. A.)].
- 46. Sewage and Soil Fertility by J. P. J. van Vuren, 1948 (Faber and (Faber Ltd., London).
- 47. Sewage Disposal in India by G. B. Williams. 1924 (Thacker, Spink and Co., Ltd., Calcutta).
- 48. Sewage and Sewage Treatment by H. Babbitt, 1947 (Chapman and Hall Ltd., London).
- 49. Sewage Treatment by K. Imhoff and G. Fair, 1940 (Chapman and Hall Ltd., London).
- Tomorrow's Food by J. Rorty and P. Norman, 1947 (Prentice Hall, New York).
- 51. Vegetable Waste to fertile Soil by Maye E. Bruce, 1945 (Faber and Faber Ltd., London).
- 52. Waste Products of Agriculture by Sir Albert Howard and Y. D. Wad, 1931 (Oxford University Press, London).
- 53. Way of the Land by Sir George Stapledon, 1948 (Faber and Faber Ltd., London).
- Wheel of Halth by G. T. Wrench, 1938 (C. W. Daniel and Co., London).
- 55. Waste Materials, use of by A. Bruttini, 1931 (P. S. King and Co., London).
- 56. Water Supply and Sewage by E. W. Steel, 1947 (Mc Graw Hill Book Co. Inc. London).

#### COMPOST MAGAZINES:

- 57. Compost Magazine, Bimonthly Journal published by the New Zealand Humic Compost Society, New Zealand, P. O. Box 15W, Auckland C. 1. (New Zealand).
- 58. "Organic Gardening, Monthly Journal, Edited by J. I. Rodale, Emmaus, Pa (U. S. A.).
- 59. "Organic Farmer", Monthly Journal, Edited by J. I. Rodale, Department OG 11-F, Emmaus, Pa (U. S. A.).
- Health and the Soil, Quarterly Journal, Edited by Dr. A. Campbell, 48. Manor Place, Edinburgh 3.
- 61. "Compost Bullettin", Quarterly Journal, issued by the Compost Development Officer, Ministry of Agriculture, Government of India, New Delhi.
- 62. "Mother Earth". Quarterly Journal, issued by the Soil Association Ltd., New Bells Farm, Haughley, Suffolk (England).
- 63. "The Farmer", Quarterly Journal, Edited by Mr. Newman Turner, Goosegreen Farm, Suttan Mallet, Bridge Water, Somerset (England).

- OF KINDS

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## APPENDIX D

## URBAN COMPOST SCHEME STATISTICS FOR THE QUARTER ENDING 30.9-1949.

		No	Vol.	Vol.	Total	Total
		of Cent-	of	compost	vol.	vol. of unsold
_	1	tres	prepared			compost
Serial		ope-	during	ring the	sold during	
ě	Province or State	rating		quarter	the year	new) in
	4		quarter	1	from 1st	stock at
No.	1				April, 49	the end
	114	1	1			of the
	ì	1		1	1	quarter
			eu, ft,	cu. ft.	eu. ft.	cu, ft.
i	Ajmer-Merwara .	4	78,550	45,920	82,400	5,66,080
2	Bihar	24	2,46,764	34,493	1,06,633	13,58,584
3	Bombay	91	21,09,510	7.36,920	33,46.340	50,21,800
4	Coorg	1	2,800	1	1	
5	C. P. and Berar	105	7,97.300	62,650	6,74,685	35,89,350
6	Delhi .	4	1,41,000	1,41,000	2,86,725	• •
7	East Punjab	16	5,01,410	3,00,380	4,61,440	9,39,840
8	Hyderabud State .	36	2,07,331	29,309	87,424	6,86,835
9	Madhayabharat Umon	36	4,90,850	54,925	2,24,500	15,17,455
10	Madra≈	95	16,78,196	10,04,524	31,24,202	40,80,089
11	Mysore State	73	2,89,563	12,06,458	20,32,894	3,19,235
12	Orissa .	$\mathbf{s}$	76,872	9,625	31,075	3,04,477
13	Travancore Cochin Union	20	94,680	88,099	1,68,839	1,86,180
14	United Provinces	199	34,00,040	31,66,520	54,04,310	92,57,540
15	West Bengal	28	2,07,989	26,722	1,05,172	9,22,479
13	Bhopal	2	2,75,000			<b>2,75,0</b> 00
4	Total . :	7,4?	1,05,97,855	69,07,845	1,61,36,639	2,90,55,954



#### NOTE

This Bulletin is intended for the information of officerengaged in operating Compost Schemes, in order to keep them posted with the latest scientific and practical developments taking place in their field, in India and abroad. It must be anderstood, however, that the views expressed in this bulletin are not binding on the Government of India.

## **COMPOST BULLETIN**

### (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

# Issued by the Director of Compost, Ministry of Agriculture, Government of India

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## COMPOST BULLETIN

#### 1. Gram Khad Pradarshaks.

In the ultimate analysis, the success of a Grow More Food Campaign, especially to the tune of several million tons, as aimed at now, is not possible of achievement on the basis of Governmental effort alone e.g. by way of supply of funds, machinery etc. The deciding factor which could guarantee visible results is the active co-operation and intelligent execution of the Grow More Food programme by the mass of cultivators, each man acting within his own resources and to the best of his capacity. It was with the help of such an appeal to the individual farmer and worker that England was able to raise its agricultural production during War time from 25% to about 50% of its national requirements.

The laurching of a similar drive to contact the individual cultivator in India is complicated by several factors such as the enormous number of villages to the tune of 51 lakhs which have to be approached, the astronomical number of agricultural holdings, estimated at about 50 millions which have to be organised, the general illiteracy of the cultivator class, the absence of community (radio) receivers in most villages and the limited staff and funds possessed by most provincial governments. The only Department which p : esses adequate staff to cope with the work is the Revenue Department which maintains an organisation of District Collectors and Tahsildars, stretching down to the Village Patels, Patwaris and Karnams. As its name implies, this organisation was originally developed mainly for purpose of revenue collection but in the context of the changed times after achievement of independence, the above Department would have to broaden its sphere of work so as to include the enormous and responsible duty of improving the economic and social condition of the villages, which contain nearly 75% of the total population of the country. During the present national crisis of food deficiency and the declared intention of the Government to stop imports of foodgrains after 1951, the Revenue Department should come forward to work with their whole "might and main" in order to make the Government's programme a saccess.

Some of the items of the Grow More Food Campaign, like reclamation of waste land, digging of wells etc. are of special application to certain localities only, but there is one item which is a common factor to all areas in India, viz., Manure. average crop yields in India are much below those of other countries and Indian soils show a ready response to application of Supplies of chemical fertilizers are small and their use is concentrated on certain cash crops only. But there are enormous resources for increasing indigenous organic manure supply in the country. If only a portion of the above resources could be utilized, our food problem would automatically be solved. The two main directions in which the indigenous manure sapply could be facter sed readily are: (1) from wrb a refuse and (2) from conservation of cattle urine and better storage of manare in villages. Item No. (1) has already been taken up with considerable vigour and energy by State Governments, several of waom have passed legislation to compel Municipalities to convert their refuse material like katchra and night soil, into compost measure; at present nearly 10 lakh tons of manure are being supplied by about 750 manicipal centres and a target of 100 laks tons is being altimat 1, aimed at from 5,000 urban centres. In view of the comporatively small number of urban centres, the Agricultural Department in co-operation with the Municipal and Public Health Departments would be able to cope with the manure production and distribution work at the wrban centres.

In the matter of villages, however, of which there are nearly 5% lakhs, the scope for increasing mapure production is much greater, being of the order of 100 million tens. 2 to 3 million tons of valuable nitrogen is at present going to waste in our village cattle sheds, in the form of cattle urine, which is allowed to soak into the cattle shed floor during the night-time when the animals are tied up in the sheds or ie the At least one half the above quantity of urine can be saved from loss by spreading vegetable litter or earth at the places where the urine soaks into the ground. In order to ensure the conservation of the urine so absorbed, it is necessary that the urine soaked litter should be preserved along with cow dung and other farm and hoasehold refuse, in trenches, which are filled by the method of sectional filling. If this improve ment alone be effected, it is estimated that our food production can be increased by 4-5 million tons-more than sufficient to make the country self-contained in the matter of food stuffs

In order to achieve success in the above direction, it is necessary that the improved methods of manure preparation and urine conservation should be demonstrated in all the villages in India along with intensive propaganda. The only agency which can carry out this task throughout the country in a short time is the revenue staff of village Patels, and Patwaris, of whom there is one for every group of 2 or 3 adjoining villages. The Agricultural Department must act as Technical advisers to the Revenue Department in organizing the above manure production drive in the villages. For the above purpose, the District Agricultural Officer or a Compost Assistant should open a Manure Demonstration Centre at each Tahsil Headquarters at which the village Patwaris of the Tahsil can be trained (for a day) in batches. The village patwaris could then open similar demonstration centres in their respective villages.

Due, however, to the general conservative mental make up of our village cultivators, many of whom are illiterate and follow old traditional habits and methods without any scientific or analytical examination, a few days' demonstration or even intensive oral propaganda in the villages will not yield the desired large-scale results of making the majority of the villagers adopt the improved methods of manure preparation on a routine basis. This can be achieved only by one of the cultivators in each village adopting and following the improved method on a routine basis throughout the year. Such a person will be a Gram Khad Pradarshak and the villagers will soon see for themselves that the manure prepared by the Pradarshak is of good quality and his crop yields are high; and as such they will also adopt the improved methods on a routine basis.

It is therefore necessary that for rapid and effective success, the village Compost Scheme should be operated with the help of Gram Khad Pradarsnaks, selected by the Patwaris one in each village. The Patwari, who has been trained at the Tahsil headquarters, will in his turn train the Gram Khad Pradarshak, who will operate the improved system of manure preparation in the village on a routine basis throughout the year for demonstration to the other villagers. A Certificate of "Approved Khad Pradarshak" should be granted to each Pradarshak and if necessary an allowance of say Rs. 10—15 to meet the cost of digging pits and carrying out the demonstration may be given at the end of the year, if the demonstration has been satisfactorily carried out throughout the year. It is unnecessary to continue the allowance in the second year, since the

Pradarshak and the villagers would have realised by that time the full value and advantages of the improved methods and would not like to go back to their old crude and wasteful methods.

In order, however, to stimulate enthusiasm amon, villagers to adopt the improved methods of manure preparation, it would be useful during the first year to hold manure competitions in each village or group of 2 or 3 villages, which may come under a Patwari's jurisdiction. In such competitions, pugrees, medals and certificates will be awarded to the individuals who have shown the best performances of manure production, as judged by the quantity of manure prepared per head of cattle during the year. The above competitions may be supervised by the Gram Panchayat, Village Co-operative Society or Village Food Production Committee where these exist or by an ad hoc Committee consisting of the Village Patel, Patwari, Sarpanch, Village Schoolmaster and 2 or 3 prominent villagers.

The corner stones for success in such a village manure drive would however remain the Patwari and the Gram Khad Pradarshak.

## 2. Compost Legislation in States.

Madhya Pradesh took the lead in May 1948 in promulgating an Ordinance to compel municipalities to convert their urban refuse into compost manure. East Punjab followed suit in July 1949, and promulgated two Ordinances in the matter, one for urban composting by municipalities and the other to compel villagers to store their manure properly in pits. The texts of these Ordinances have appeared in the issues of the Compost Bulletin Vol. I No. 2, June, 1948 and Vol. 2, No. 3, September, 1949.

The Central Manure (Compost) Development Committee at their meetings held at Nagpur in July 1948 and at Jaipur in December, 1948 recommended that all States should immediately pass legislation to compel municipalities to convert their urban refuse into manure and this recommendation was accepted by the Government of India. The Conference of Provincial Grow More Food officers held in New Delhi in November, 1949 also accepted a similar recommendation.

It is satisfactory to note that a number of States like Bombay, Bihar, Orissa and Mysore have followed suit and have enacted legislation for municipal composting. The texts of these legislations are given in Appendix A to the present issue of

the Bulletin. Mysore has some a step further than the other States and has followed the East Punjab example in enacting legislation also for compost production by village Panchayats and for proper storage of manure in pits by the villagers.

The remaining States like Madhyabharat, Saurashtra, Rajasthan and Travancore are also introducing in their legislative assemblies Bills for urban composting, so much so that within the next few months almost all Municipalities in India would be made to realise their duty, according to law, to convert their refuse material into manure instead of wastefully throwing them or burning them or dumping them into low lying land.

One can visualise in the near fature similar legislation to ensure that all sewage and sullage water is utilised by municipalities for growing crops, instead of being let into nallas or into the ocean as at present. The aim of all such urban legislation is to see that the manurial value of materials brought into towns from the surrounding agricultural area in the form of food grains, fodder feeding stuffs and industrial raw products, is again returned to the agricultural area in the shape of compost manure or sewage effluent, so that soil fertility and production may be maintained without deterioration.

Of course, the law of "return to the soil what has been taken out of it" applies not only to the urban areas, but also to villages and tarms. In fact, our greatest loss of manure today occurs in the raral areas, where nearly 200 million tons of cattle dung are being burnt and 2-3 million tons of nitrogen in the form of cattle urine are being wasted. East Panjab and Mysore have led the way to show how this wastage could be minimised; but in addition to legislation what is needed is very intentive propage ada and demonstrations in each village somewhat on the Bomboy model of Laving village Food Production Committees and Gram Sudhar Week celebrations, details of which have appeared in the last issue of Compost Bulletin (Vol. 2 No. 4. December, 1949). A widespread tree planting campaign should also be initiated, so that alternative fuel could be provided in sufficient quantity to take the place of cow dung now being burnt. With the help of such an intensive drive among villegers, legislation would prove useful in achieving maximum result in a short time.

## 3. Taccavi Loans for distribution of Town Compost.

Now that legislation has been or is under consideration in most States to compel municipalities to convert the whole of their refuse material into compost manare, it is necessary that adequate steps should be taken to provide the necessary facilities required by municipalities for the preparation and sale of compost manure. In the matter of preparation, municipalities may have to be provided with lands for establishing compost depots. Several States Governments have recently taken powers for expeditious requisitioning of land needed for common good purposes and under this legislation, it should be possible to place at the disposal of the municipalities lands needed for compost manufacture. In the case of bigger municipalities of population above 50,000 it would be found convenient to establish two compost depots one at each end of the town so as to facilitate easy transport of refuse material. This would also help easier distribution, but the size of each Compost Depot should be not less than 3,000 tons capacity per year in order to minimise supervision charges.

In addition to land, several municipalities might also require financial help from Government by way of loans for purchase of motor trucks for transporting refuse from the town to the Compost Depot. The present methods of disposal adopted at everal centres is most ansatisfactory, since most of the katchar (dry refuse) is damped within the town limits, themselves in pits and low lying areas. Even a good portion of the night soil is so disposed off by the sweepers, and only a small portion is taken out of municipal limits to the trenching ground. If the whole quantity of refuse produced within municipal limits is to be taken to the Compost Depor, the municipality may have to purch se and use some additional motor trucks for the purpose.

In the case of big cities like Bombay, Calcutta, Delhi and Madras, which are sewered, the problem of utilisation of night-soil becomes merged with that of sewage farming, but the katchra (dry refuse) is still available for use, often in huge dumps of the order of lakks of tons per year. In India, the katchra of big towns contains plenty of organic matter easily decomposable by itself, without the addition of night-soil or other starter. Chemical analysis of the manure has shown that within a year i.e. after one monsoon has passed, the manare is ready for application to land and contains about 1% of nitrogen (on the dry basis) like other types of compost.

The main difficulties experienced in the matter of distributing town compost are (1) the need for sieving the manure before sale, in order to remove objectionable materials like glass, tin, brick bats, porcelair etc. which are likely to be harmful when applied to land and (2) the need for providing cheap transport facilities to enable the cultivators to transport the bulky manare from the Compost Depot to their lands. Sieving has to be compulserily done at the bigger centres of population above 50,000 since there is much of andesirable materials in the manure produced at such big centres, but at the smaller centres the propertion of impurity is much less and any tins, glass or brickbats present could be removed by land while I ading the carts. Expanded metal sieves (of size 6 ft, length and 4 ft. breadth) sheald nowever be provided at all compost depots so that they can be kept on top of the corts while filling up with the compost. In the case of big centrer, where sweeper I bour is scarce and costly, mechanically operated screens could be used for sieving the manure.

In order to make a success of legislation for municipal composting, it is necessary that Government through their Department of Agriculture should guarantee to all assimicipalities the sale of compost manure prepared by them, at prices fixed by Government so as to cover the manicipal expenses of production. There expenses of production would include the manufacturing charges incurred at the Compost Deportand would exclude the expenses of collection of refuse within the town or its ransport from the town to the Compost Depot. of Agriculture should maintain special staff at all new centies in order to introduce the manure to the cultivators living within 10 miles radius of the towns. In each to overcome prejudice and popularize the manure it may be necessary, during the first year or two to sell the manure at a reduced price and necessary subsidy should be provided for this purpose. In addition, it would be necessary, at the bigger centres, to maintain Departmental motor tracks for distributing the manure at reasonable rates of transport. The experience gained during the last few years has shown that the above concessions and special effort are needed for the first year or two only at new centres; within this time a market gets established for the manure and its production and distribution can then be done on a basis which would bring a margin of profit to the saunicipality.

In the case of big cities where there are heavy accumulations of lakhs of tons of manure, special efforts are needed to dispose of the old accumulations. Installation of sieving machinery would provide a continuous supply of large quantities of good manure. In addition to employing motor trucks for distribution purposes (within 10 or 15 miles distance, it would be necessary to employ railway transport for movement to greater distances, say upto 200 miles. The experience of Bombay and Calcutta has shown that it is possible to supply the manure by railway within a distance of 150—200 miles at an all-in-rate of Rs. 10-12 per ton including railway freight. Farmers growing crops under intensive cultivation e.g. potatoes, bananas, vegetables and sugarcane, an afford to purchase the manure of the above rates.

The Urban Compost Scheme is, at present, producing about 10 lakh tors manure per year, whereas there is existing capacity for manure production upto a level of 50-60 lakh tons per year. Under the plan for making the country selfsufficient in food before the end of 1951, it is necessary to reach a target of 20 lakh tons at least during 1950-51 and 40 lakh tons during 1951-52. If these all India targets are to be achieved, bold measures on a big scale are necessary. Municipal legislation has no doubt paved the way for large scale production of manure but what is needed are equally large scale measures for distribution of the manure produced This work should be undertaken by the State Governments through their Departments of Agriculture who should maintain their own staff and fleet of motor trucks and arrange for railway movement whereever necessary. Government subsidy for distribution should be reduced to the minimum possible and attempts should be made to operate the distribution Schemes on a no-profit-noloss basis. There is considerable scope and need for manure application in the intensively cultivated areas round about towns and such application is quite profitable to the cubivator, but the main difficulty is the apathy, lack of enterprise and unwillingness to risk money in purchase of manure on the part of our cultivators. This unsatisfactory position can be broken down by intensive propaganda and demonstration of the manurial value of the compost, and at the bigger Centres, where there are heavy accumulations of manure by the State Governments offering the manure to cultivators in the first year or a taccavi loan basis.

Taccavi loans are at present advanced to cultivators by Government for major purposes such as digging wells or making other permanent improvements in the land: but in view of the imperative need to grow as much food as possible, there is every justification for extending the scope of taccavi loans so as to cover other purposes like purchase of improved seed, implements or manure. Possibly, the whole of the compost manure that may be produced by municipalities up to a limit of even 50 lakh tons can be distributed, with considerable increase of food production in the country, if each State, could prepare bold plans to employ sufficient number of motor trucks and make necessary railway arrangements for the above purpose and also provide funds (say at the rate of Rs. 4-5 per ton or about Rs. 2 crores loan for the whole of Iedia) for issue of the manure on taccavi loan, basis to cultivators during the first year.

## 4. Compost Development in Uttar Pradese.

A recent report received from Uttar Pradesh gives details of the progress of compost production from the urban and rural areas of that State, as follows:—

#### TOWN COMPOST

"Preparation of compose from town refuse has continued to make good progress in the State. The number of municipalities, Notified and Town Areas participating in the scheme has steedily risen from 101 in 1946-47 to 183 in 1948-49, which with the addition of 27 new centressince April, 1949 has usen to 210 at present. The production in 1948-49 was 2,44,667 tons against 1,80,760 tons in 1947-48 and 1,32,200 tons in 1946-47. From April to December, 1949 the production was 2,14,500 tons which promises to increase upto 4,00,000 tons by Morch, 1950.

"The earlier prejudices against handling this manure have largely disappeared and in many places the demand has actually outgrown the samply. The altimate aim is to introduce composting in all the 250 towns of the Province with a population of over 5,000 and produce 6 lakh tons compost per year, when all the centres have started working on fall scale. Every encouragement is being given by Government to the local bodies to take up this work, including interest free loans for purchase of trucks and cart, a abaidy on sale where necessary and grant-in-aid of Rs. 250/- to small Notified and Town Are is for meeting initial expenditure. A fleet of 12 tracks has also

been provided for transport of town compose to cultivators' fields to supplement their own means of transport. By availing of tacse facilities the local bodies can turn all their wastes into wealth and thus contribute towards increase in food production and at the same time make their towns cleaner than what they are

#### RURAL COMPOST

"The conversion of raral wastes into manure with its enormous possibilities also received large impetus in the province during the last year and new fillip was giver to it with the launching of the intensive scheme since January 1948. door approach was made for training the rural masses in compost making and helping them to develop their own manurial presources as a routine agricultural practice. Besides making direct contact with the village people, local leadership was also developed among them for creating wide interest in compost making and watching the fulfilment of targets prescribed for each village and each householder on the basis of cattle populations. Village School teachers were largely associated with the task of creating compost consciousness in the youths in the rural areas and the primary schools were atilised for creating permanent compost training centres. A lesson on compost making has also been included in the syllabus for Class V of Basic Schools

"Compost making was organised in 20,821 villages including the villages of the devlopment blocks. In addition to routine operation of compost making, compost drives were also organised periodically during leaffall and autumn, when extra organic material was available. The total quantity of rural compost prepared in 1948-49 in the above villages, participating in the Scheme, was 22,17,970 tons against the production of 10,07,480 tons in the preceding year. Intensive composting of water-hyacinth was also organised departmentally in 16 districts of the Province. 24 lakh cu. ft. of fresh material was composted which yielded 5,200 tons of ready manure. In addition to this, 11,150 tons of compost was also prepared in sugar factory yards from press-mad and yard wastes.

"In the absence of proper organisation in the villages, considerable difficulties were experienced in getting local people to take the desired interest. In compost lies the fate of Agriculture. Now that the Panchayats have started functioning, they should take upon themselves this task on a compulsory basis. Their active participation in the compost programme can

greatly accelerate the pace of compost production with simultaneous improvement in village sanitation."

## 5. Manurial value of Town Compost.

Data relating to the manurial value of Town Compost were published in the issues of Compost Bulletin Vol. 1 No. 3 Sept. 1948 (pp. 22-26) and Vol. 2 No. 2, June, 1949 (pp. 21-34). Further data relating to field trials carried out in different States have been received, and are giver in Appendix B to the present issue of the Bulletin. These data conclusively prove that Urban Compost possesses good manurial value. The docage recommended for different crops and the extra yield that can be expected have been given in the previous issue of the Bulletin (Vol. 2 No. 3, Sept. 1949 pp. 6-7). From the above, it would appear that town compost is specially suitable for growing root crops like potatoes and sweet potatoes and also fruits like bananas and papayas and also vegetables and sugarcane. In these cases the content of phosphoric acid in urban compost (averaging about 1 per cent. on the dry basis) exerts as much influence on crop yield as that of nitrogen. In the case of potatoes, sweet potatoes, bananas and vegetables, the application of town compost at the rate of 10 tors per acre, gives a food production increase of about 50 maunds or about 2 tors per acre. It would therefore, appear that about 20 per cert. If the compost by weight can be transformed into the above food products. this rate the present production of 10 lakh tons of urban compost can be estimated to be supplying the country with an extra 2 lakh tons of foodstuffs in the form of potatoes, vegetables and fruits which are largely grown round about cities by applications of urban compost.

## 6. Compost Development in Saurashtra.

Saurashtra Union which has been formed by the integration of more than 200 small states, is now a major unit, which can plan out its development on a big scale. It is at present reorganising its Department of Agriculture and framing an active programme of developmental work. The Compost Development Officer to the Government of India made an examination of the scope that exists for increasing manure production in the urban and rural areas of the Union and has put up proposals for producing 34,000 tons of compost manure from municipal refuse available at the bigger centres like Jamnagar, Bhavnagar, Junagadh and Rajkot. There are in all 92 municipal centres in Saurashtra Union and these together can produce 150,000

tons of manure. It is necessary to have a local Compost Development Officer to execute plans for a chieving the above production of manure. Saurashtra Govt. have under consideration legislation to make it obligatory on all municipalities to convert their refuse material into compost.

As regards rural areas, Saurashtra can boast of quite good farmers, especially in the intensively cultivated areas of Junagadh, Halar and Gohelwad Districts. Visits paid to several villages showed that the cultivators prepared from 10 to 12 cartloads of manure per head of cattle per year. In these intensively cultivated areas, very little of cowdung was burnt and cultivators took great trouble to collect and use wood fael, for, as they explained, they knew that cowdung was "too good as manure to be barntaway". In the light and sometimes sandy soils of Saurashtra, cowdung manure has given very good results, increasing yield of foodgrains by about 4 to 5 mounds (Bengal) per acre. In addition to saving cowdung from being burnt and using almost the whole of it in menure preparation, the cultivators add a great deal of bejood litter and grass fodder remains to their manure heaps.

As regards the cattle-sheds, however, it must be admitted that the farmers of Sourasntra have in the majority of cases not yet realised the value of cattle urine. Their method of storing manure is also defective, since they generally throw it in overground heaps. The two (viz. neglect to conserve cattle urine and defective methods of storage) generally go together in most areas of the country and Saurashtra is no exception. An intensive drive throughout the 4,000 villages of Saurashtra in order to demonstrate to them the improved methods of manure preparation is necessary. This must be carried out with the help of Tahsil Demonstration Centres, training of Village putwaris and establishment of Gram Khad Pradarshaks as explained in detail elswehere in this issue of the Bulletin.

# 7. Compost Teaching in Schools.

Reports received from States show that several Governments have taken steps to introduce compost teaching and demonstrations in their schools.

The Madras Government have given instructions for imparting lessons or "Practical Composting" in connection with nature study and gardening in lower elementary stages and ander Elementary Science in higher elementary stages in all Schools.

and for forming small compost pits for demonstrating farmyard compost in village schools where facilities are available.

East Panjab Government have introduced compost making in all schools which maintain agricultural farms.

The Ajmer-Merwara Administration have taken the following steps to popularize compest making in schools:

- (1) Instructions have beer issued for digging and maintaining in routine of eration compost pits in all Boys Secondary Schools having agriculture as one of the optional subjects;
- (2) Teachers in charge of Compost making will be given practical training in compost making by the Local-Agriculture Department to enable them to reach the subject;
- (3) The Inspectorate of the Education Department have been instructed to watch the activity of compost, making in Schools and to keep its detailed record;
- (4) The Inspectorate have also been asked to invite villagers to see these pits and take full advantage of the demonstration; and
- (5) In Girls' schools, girls will be instructed in the need for composting cow-dung and not using it as a fuel.

"In view of the fact that women are mostly responsible for using cow-dung as fuel in households, it is essential to instruct girls in this matter. The Inspectress of Girls Schools has been asked to make provision for such instruction in the schools."

The Government of West Bengal have included "Compost making" in the syllabus in all primary and secondary schools, in their State.

The Chief Commissioner, Coorg reports that "during 1947-48 and 1948-49 demonstration compost pits were opened in most of the Schools in Coorg and the results achieved were very satisfactory. During 1948-49, classes were held at Virajpet, a central town in South Coorg, to train the school teachers in agricultural subjects, at which lectures on the preparation of composts out of rural wastes were delivered".

The Bihar Government have given instructions that wherever there are Veterinary Hospitals near schools, the art of making compost should be taught as a part of the gardening work of students. The Director of Veterinary Services has also here Methods:

been asked to instruct the officers-in-charge of the Veterinary Hospitals to accord all possible assistance to the District Inspectors of Schools, who will contact these officers and with their collaboration make necessary arrangements for teaching the art of making compost, to the students.

The Bombay Government state in their Report.—" This subject (compost-teaching) has been included in the syllal us of Primary Schools in the Bombay Prevince, in which agriculture is introduced as a craft.. Children in these schools will learn the subject in the normal course..... The Director of Fublic Instruction, Bombay Province, has issued instructions to all Government training institutions to teach "Compost-making" in the theory of kitchen gardening and to have " Compostpits" on the kitchen gardening farm, so as to enable teachers to know compost-making in a practical way..... regard to Secondary Schools, compost making has already been introduced in the syllabus for Agricultural High Schools..... The subject has been included in the curriculum of Sanitary Inspectors classes held in Bombay and Poona. The question of utilising the services of the Sanitary squads of the Public Bealth Department of this Province for demonstration and propaganda in compost making in villages is also under consideration of Government

Bombay has taken a considerable lead over other States in utilising Teachers and students in carrying out their all-out drive to improve manure production in villages during the Gram Sudhar Saptah that was observed all over the State in commemoration of Mahatma Gandhi Jayanti (2nd to 8th October, 1949).

In their circular on the subject, the Bombay Government

"In the implementation of the Grow More Food Programme, the collection and preparation on scientific lines of farmyard manure is an essential item. This work must necessarily be carried out in the villages themselves. Government consider that teachers and students in primary schools, who are becoming increasingly anxious to serve the country in this heur of need, can make an effective contribution to the Grow More Food Programme by taking a leading role in this work. The teacher, often the only educated person in the village, is in a position to guide the villagers on right lines; if, further, he and his pupils take part in the actual construction of manure with and the preparation of manure, they should be able to

erouse enthusiasm among the villagers and secure their cooperation, so that after some time the villagers will, of their own accord, carry out the work".

The plan of work adopted by Bombay State in this matter can with advantage be followed in other States also; viz:—

- (i) The Director of Agriculture will arrange to distribute to all Assistant Deputy Educational Inspectors pamphlets in the local language, containing instructions as to the manner of preparing manure pits and compost. The Assistant Deputy Educational Inspectors will distribute the pamphlets to all primary school teachers in the area in their charge.
- (ii) The local Agricultural Assistant will also give practical training in this work to persons who are willing to participate in this work of national importance. The Agricultural Assistant will notify villages direct of the time and place at which training will be given. The place of training will be so arranged that ordinarily a person would not have to travel for more than five miles. The duration of training will be one day. Assistant Deputy Educational Inspectors, Primary School Teachers, and some of the older students, who are willing to volunteer for the work should make every effort to attend the training classes.
- (c) Government will organise a Grow More Food Week throughout the State. An important feature of this programme will be the digging of manure pits and the preparation of manure on improved lines. Primary School Teachers and students should during the above week. (a) explain to the villagers the advantages of treating village and farm refuse in a scientific manner so as to increase its value as a manure;
- (b) demonstrate to them the manner in which manure pits stiented be dag and the manure prepared;
- (c) dig out pits, collect leaves, and refuse and pass it through the cattlesheds, to absorb Cattle urine, remove to the pits the refuse from cattlesheds and, by precept, induce the owner to adopt the improved methods; and
- (d) keep careful watch to ensure that villagers continue to use the improved methods and do not revert to their old practices;
- (e) Teachers who distinguish themselves in this work will be awarded special certificates of merit and their names will be published in the Gazette. The fact will also be recorded in their character rolls and will be recognised as Social Service Workers.

(1) Government have under consideration a scheme of subsidy for the preparation of manure pits and the manufacture of compest. The Village Food Production Committee will assess the work done by the teacher and his pupils and the subsidy in respect of such work will be paid to the village school for being spent on improving the amenities of the School.

# 8. Compost Development in Madhyabharat.

Madhyabharat Union is a fairly big unit containing 120 towns and about 20,000 villages, with a total human population of 78 lakhs and cattle popultion of about 80 lakhs. Its urban population of 15 lakhs can produce about 1,50,000 tons of good quality compost per year. Before the integration, Gwalior State was having a Compost Biochemist in its Department of Municipalities who had organised compost production from municipal refuse to the extent of 10,000 tons during 1947-48 and 14,000 tons during 1948-49. After the integration, however, the scope for increased manare production has greatly increased, but side by side with increased production, arrangements would have to be made for rapid distribution of the manure prepared.

The Compost Development Officer to the Government of India made a fortnight's tour of the urban and rural centres in Madhyelharat in January-Februery, 1949 with a view to framing suitable proposals for expanding manure production in the Union. Plans were framed in consultation with the State authorities to increase production of compost manure in the drban areas to a level of 20,000 tors during 1949-50 and 70,000 tons during 1950-51. Leans to the extent of nearly Rs. 5 lakhs would be given to the municipalities concerned for nurchase of motor trucks and carts for collection and transport of refuse and for establishment of compost Depots. In order to distribute the increased quantities of manure prepared by the municipalities, the Acricultural Department would rurchase and maintain a flect of 10 meter trucks, which would be operated at the bigger centres where there is heavy accumulation of stocks. Where there is projudice among cultivators against the new type of con post, subsidies would be effered to reduce its sale price and encourage cultivators to use the same.

The Madhyabharat Government are also operating at precent on a small scale a Village Compost Scheme, under which subsidies are being offered for digging manure pits in villages. It is proposed to expand this work considerably and recast it in the form of an intensive propaganda drive accompanied by demonstrations of the improved methods of manure preparation in each village through the agency of Village Patwaris and Gram Khad Pradarshkas. Competitions will be held in each group of villages and pugrees, medals and certificates would be awarded for the individuals showing the best performances. With the help of such an intensive drive, it is hoped to produce nearly 5,00,000 tons of compost in the villages of the Union during 1950-51.

## APPENDIX A

# LEGISLATION FOR MUNICIPAL COMPOSTING.

### (i) MYSORE STATE

The Mysore Town Municipalities (3nd Amendment) Bill 1949

A Bill further to amend the Mysore Town Municipalities Act 1933 (Act VIII, 1983).

Preamble.—Whereas it is expedient further to amend the Mystre Town Municipalities Act, 1933, for the purpose hereinafter appearing;

It is hereby enacted as follows :-

- 1. Short title.—This Act may be called the Mysore Town Municipalities (Third Amendment) Act, 1949.
- 2. Amendment of section 55, Act VIII of 1933.—After clause (c) of section 55 of the Mysore Town Municipalities Act, 1933 (VIII of 1933), the following clause shall be inserted, namely:—
  - "(cc) disposing of, and if so required by Government, preparation of compost manure from nightsoil and rubbish.

### Explanation

In the clause, 'rubbish' includes dust, ashes, broken bricks, mortar, broken glass, sewage, dung, dirt, putrid and putrifying substances and refuse of any kind.

### STATEMENT OF PRINCIPLES

A Scheme for the preparation of compost manure from nightsoil and rutbish was started in Mysore in 1943, in order to make available organic manure to agriculturists. No satisfactory progress has, however, been made during the last six years. This is due to unwillingness of municipalities to give up their antiquated methods of disposing of nightsoil and rubbish. It is estimated that only a very small percentage of the evailable nightsoil and rulbish is converted into compost manure and that the vest bulk of this useful manure is being wasted. There is no provision in the municipal Acts requiring municipalities to dispose of nightsoil and rul bish in the Municipal areas in a particular manner. In order to prevent this waste and make full use of the nightsoil and rubbish in the preparation of compost manure which can advantageously be ptilised under the "Grow More Food Campaign", it is proposed to amend the Mysore Town Municipalities Act, 1933, so as to make it obligatory duty of municipalities to make provision for disposing of nightsoil and rulbish and if so required by Government to convert them into compost manure. Hence this Bill.

## (ii) MYSORE STATE

THE MYSORE VILLAGE PANCHAYAT (AMENDMENT) BILL, 1949.

A Bill further to amend the Mysore Village Panchayat Act 1926.

Preamble.—Whereas it is expedient further to amend the Mysore Village Panchayat Act, 1926 (II of 1926), for the purposes hereinafter appearing:

## It is hemby exacted as follows :--

- 1. Short title.—This Act may be called the Mysore Village Panchayat (Asserdment), Act, 1949.
- 2. Amendment of section 20, Act II of 1926.—In section 20 of the Mysore Village Panchayat Act, 1926 (hereinafter referred to as the said Act),—
  - (a) after clause (iii) the following shall be inserted namely:-
  - "(iiia) Disposing of, and if so required by the Government, prepation of compost manure from nightsoil and rubbish.

Explanation.—In this clause rubbish includes dust, ashes, broken bricks, mortar, broken glass, sewage, dung, dirt, putrid and putrifying substances, and refuse of any kind;

- (b) after clause (vii) the following clauses shall be inserted, namely:—
- " (wis) Construction and maintenance of public lavatories in the village:
- (with Excevation and maintenance of manure pits for depositing village subbish and farmyard manure;
- 3. Insertion of new section 31A in Act II of 1926.—After section 31 of the said Act, the following section shall be inserted, namely:—
- "31A. Maintenance of manure pits.—Every owner or occupier of any hut or building within the jurisdiction of a Panchayat shall excavate and maintain such pits as may be prescribed, and deposit therein all farmyard manure and refuse of any other kind.
- 4. Insertion of section 59A in Act II of 1926.—After section 59 of the said Act, the following section shall be inserted, namely:—
- "59A. When any land is required for the purposes of this Act, the Government may proceed to acquire it under the Mysore Land Acquisition Act, 1894, and on payment by the Panchayat of the compensation awarded under that Act and of any other charges incurred by the Government in connection with the acquisition, the land shall vest in the Panchayat".
- 5. Amendment of section 63, Act II of 1926.—After clause (b) of subsection (1) of section 63 of the said Act, the following clause will be inserted, namely:—
  - " (ba) contravenes the provisions of section 31A; or "

### STATEMENT OF PRINCIPLES

A Scheme for the preparation of compost manure from nightsoil and rubbish was started in Mysore in 1943 in order to make available organic manure to agriculturists. No satisfactory progress has, however, been made during the last 6 years. It is estimated that only a very small percentage of the available nightsoil and rubbish is converted into compost manure and the vast bulk of this useful manure is being wasted. There is no provision in the Mysore Village Panchayat Act 1926, requiring

Village Panchayats to dispose of nightsoil and rubbish in the areas under their control in a particular manner. In order to prevent this waste and make full use of the nightsoil and rubbish in the preparation of compose manure which can advantageously be utilised under the "Grow More Food Campaign", it is proposed to amend the Mysore Village Panchayat Act, 1926, so as to make it obligatory duty of Village Panchayats to make provision for disposing of nightsoil and rubbish and if so required by Government to convert them into compost manure. It is also considered necessary to make provision for the maintenance of manure pits and public lavatories by the Village Panchayats and for acquisition of land for these purposes. In order to prevent wastage of farmyard manure by the villagers, provision has to be made requiring them to maintain manure pits near their houses for depositing farmyard manure and other rubbish. The Bill is intended to secure these objects.

### (iii) BOMBAY STATE

BOMBAY DISTRICT MUNICIPAL (AMENDMENT) ACT 1949: (TO AMEND THE BOMBAY DISTRICT MUNICIPAL ACT 1901)

Amendment of section 54 of Bombay III of 1901.—In section 54 of the said Act, in sub-section (1) after clause (r) the following new clause shall be inserted, namely:—

"as" disposing of nightsoil and rubbish and, if so required by the Provincial Government, preparation of compost manure from

such nightsoil and rubbish ".

BOMBAY MUNICIPAL BOROUGH'S (AMENDMENT) ACT 1949: (To AMEND THE BOMBAY MUNICIPAL BOROUGHS ACT OF 1925).

• Amendment of section 68 of Bombay XVIII of 1925.—In section 68 of the said Act, in clause (1), in sub-clause (s), the word " and " where it occurs for the second time shall be deleted; and after the said sub-clause (s), following shall be inserted, namely:—

"(1) disposing of nightsoil and rubbish and if so required by the Provincial Government preparation of compost manure from

such nightsoil and rubbish; and "

#### STATEMENT OF OBJECTS AND REASONS

A scheme for the preparation of compost manure from town refuse was started in the Bombay Province in 1943 in order to make available organic manure to agriculturists. No satisfactory progress, has however been made during the last 5 years. This is due to the unwillingness of municipalities to give up their methods of disposing of sewage and other town refuse. There is no provision in the Municipal Acts requiring municipalities to dispose of nightsoil and rubbish in the municipal areas in a particular manner. It is therefore proposed to amend the Bombay District Municipal Act 1901 and Bombay Municipal Boroughs Act 1925, so as to make it an obligatory duty of municipalities to make provision for disposing of nightsoil and rubbish and if so required by Government to convert such nightsoil and rubbish into compost manure.

### (iv) ORISSA STATE

"THE MADRAS DISTRICT MUNICIPALITIES (ORISSA AMENDMENT) BILL, 1949

A Bill further to amend the Madras District Municipalities Act, 1920 in its application to the Province of Orissa.

Madras Act V of 1920.—Whereas it is expedient further to amend the Madras District Municipalities Act, 1920—in its application to the Province of Orissa in the manner hereinafter appearing;

It is hereby enacted as follows:--

- 1. Short title and commencemet.—(1) This Act may be called the Madras District Municipalities (Orissa Amendment) Act, 1949.
- (2) It shall come into force at once.
- 2. Madras Act V of 1920.—Amendment of section 153, Madras District Municipalities Act, 1920.—In section 153 of the Madras District Municipalities Act, 1920—
  - (a) the word "and" at the end of clause (b) shall be omitted;
  - (b) after clause (c) the following word and the clause shall be inserted, namely:—
  - "and (d) conversion of sewage, offensive matter and rubbish collected by the municipality into compost manure in the manner notified by the Provincial Government in this behalf".

# (v) ORISSA STATE

THE BIHAR & ORISSA MUNICIPAL—(ORISSA AMENDMENT) BILL 1949.

A Bill further to amend the Biliar & Orissa Municipal Act, 1922 in its application to the province of Orissa.

For section 204 of the said Act the following section shall be substituted, namely:—

- " 204. It shall be the duty of the Commissioners to provide for-
  - (a) the removal and disposal of sewage, offensive matter and rubbish from all public latrines, urinals and drains, all public roads and all other property vested in the Commissioners;
  - (b) the removal and disposal in any municipality wherein a latrine tax has been imposed under section 82 of sewage and offensive matter from all private latrines, urinals and cesspools;
  - (c) the conversion of such refuse, offensive matter and rubbish collected by the municipality into compost manure in the manner notified by the Provincial Government in this behalf; and
  - (d) the cleansing of such latrines, urinals, drains and cess-pools and maintaining sufficient establishments, cattle, carts and implements for the said purpose.

# (w) BIHAR STATE

THE BIHAR MUNICIPAL (AMENDMENT AND VALIDATION OF RECOMMENT AND TAXES) ACT, 1949

3. Amendment of section 204 of B. & O. Act VII of 1922.—In section 204 of the said Act,—

rubbish " and

- (a) after clause (b), the following clause shall be inserted, namely:—
   "(bb) if so required by the Provincial Government, to prepare in any municipality compost—manure from sewage and
- (b) in clause (d), after the brackets and letter "(b)", the brackets and letters "(bb)" shall be inserted.

# APPENDIX B

### FURTHER MANURIAL TRIALS WITH TOWN COMPONE

(Please vide also Compost Bulletin Vol. 1 No. 3, Sept. 1948 pp. 22-26, and Compost Bulletin Vol. 2, No. 2, June, 1949, pp. 21-34).

#### UTTAR PRADESH

#### 1. Trials Carried out during 1943-45

(i) Barley.—To study the effect of town compost manure used as top dressing.

Area of each plot Treatments	t		:. ost (O), a: l as top :	nd compo		100 lbs. N per ser 44.	8
Cultivation etc.		Sown on		; harves	ted on 2	5-3-45.	
	Chen	nical and	ulysis of	manure	8		
Air dry moisture		• •	••	••	••	3.72%	
Last on ignition	• •	••	• •	• •	• •	47-60%	
Carbon	••	••	••	••	• •	8.03	
Total N	••	• •	••		• •	1 6%	
C/N	• •	••	• •	••	••	8:1	
Chloride	••	••		• •	••	0.077	
		Grimana .					

# SUMMARY OF RESULTS Mean yield in seers per plot.

						Grain	Straw	Total
0	• 6	• •	••	••		2.6	4.0	9.77
C	••	••	••••	••		4.1	6.7	<b>10</b> -48
<b>6-0</b>	• •	••	• •	• •	••	+1.5	+2·7 +0·66	14-1

Nors.-1 mound=40 seers=80 lbs.

## Yield in maunds per acre

						Grain	Straw	Total
ō	• •	• •	• •	••	•••	9.5	15.0	24:3
C	••	• •	••	• •	]	15.0	24.2	39.2
0.0	••	••		••		+5.5	+9.2	+14-9

# Economics of manuring

1.	Chantity of dry compost manure applied per	·
	acro	5 tons (containing 100 lbs. N).
2.	Price of compost manure (at Lucknow) @ Rs.	
•	2/8/- per ton	Rs. 12/8/
8.	Increased yield in grain	5.5 maunds.
4.	Value of 5.5 maunds grain @ Rs. 10/- per	
	maund	Rs. 55/
5.	Crop value of I ton compost	Rs. 11/
	100 lbs. N produces 5.5 maunds grain.	
٠	1 lb. N produces 4.4 lbs. extra grain.	
	Conclusion - Application of town com-	nort manura @ 100 lbs N ne

Conclusion.—Application of town compost manure @ 100 lbs. N per acre produced 5.5 maunds extra grain and 9.2 mds. extra straw per acre.

(ii) WHEAT: TO STUDY THE EFFECT OF TOWN COMPOST MANURE THERE AS

(ii) Wheat: To study the effect of Town Compost Manuee used as top Dressing.

System of replication Area of each plot	3 randomised blocks of 3 plots each.
Treatments	No compost (O), compost at 60 lbs. N per acre (1C) a compost at 120 lbs. N per acre (2C); manure applied
Haral dressing.	as top dressing on 2-1-1945.  Castor cake @ of 40 lbs. N per acre applied at the time of sowing.
Collivation etc.	Sown on 25-10-44; harvested on 6-4-45.
r.m	Chemical analysis of manure

Same as in Experiment No. 1.

SUMMARY OF RESULTS

Mean yiell in seers per plot.

17.	944 •		Grain		Straw			
(O) 10 20	•••		• • • • • • • • • • • • • • • • • • • •	• •	1·58 2·08 1·92		4·42 5·92 4·75	1**
1981	1C -0 -1C	••	• •	••	0·50 0·34 0·16	0·25 0·17	1·50 0·33 1·17	0·7 0·6 1·0

# Yield in maunds per acre

						Grain	Straw	Total	
0.	••	• •	••	••		11.9	34.0	45.9	
10	• •	••	••	••		15.7	44.8	60.5	
0 10 20	• •	••	••	• •	••	14.5	35.0	50-4	
1C-0 2C-0	••	• •	• •	• •	••	3·8 2·6	10·8 1·9	14·6 4·5	

### Economics of manuring

3 tons (60 lbs. N). 1. Quantity of dry manure applied per acro ...

2. Price of 3 tons of manure (at Lucknow) @ Rs.

Ra. 7/8/-.

2/8/- per ton 3. Increased grain yield

3.8 maunds.

4. Value of 3.8 maunds at Rs. 10/- per maund ...

Rs. 38/-.

5. Crop value of 1 ton compost

Rs. 12-10-0.

60 lbs. N produces 3.8 mds. extra grain. 1 lb. N produces 5·1 lbs. extra grain.

# Conclusion

Application of town compost manure @ 60 lbs. N per acre with a basal dressing of 40 lbs. N in castor cake produced 3.8 mds. extra grain and 10.8 mds. extra straw while 120 lbs. N produced only 2.6 mds. extra grain and no significant increase in straw.

(N. B.—It must be noted that due to the heavy basal dressing of castor cales (40 lbs. N per acre) the individual effect of compost was superimposed thereon).

2. Trials Carried out during 1946-47

(i) Wheat: Comparison of Town Compost with farm yard manure (Government Agricultural Farm, Ballai, 1946-47)

Layout 6 randomised blocks of 5 plots each.

Plot size 1/60th acre.

Treatment: (1) No manure, (2) compost. 50 lb. N (3) compost-100 lb.N (4) Farmyard manure 50 lb. N and (5) Farm yard manure 100 lb. N.

Agricultural operations Date of sowing: 24-26 November, 1946, date of harvesting: 10-11 April, 1947, date of thrashing 13-20 May, 1947.

Note: Due to late sowing the crop was badly affected by wind and rain just at the time of flowering.

# SUMMARY OF RESULTS

## Yield in Lb. per acre.

,	:	٠,	No Manure	Comp. 50 lb. N.	Comp. 100 lb. N.	Farmyard manuro 50 lb.	Farmyird 100 lb. N
Grain Straw	••	••	1,440 2,220	1,680 2,520	1,920 2,820	1,833 2,763	2,409 3,009

#### Conclusion

- 1. There is a proportionate increase in grain and straw yield with increasing dose of compost.
- 2. 1 lb. N in compost yields 4.8 lb.additional grain and 6.00 lb. extra; draw.

(ii) Wheat: Effect of town Compost used as basal dressing in Combination with Sulphate of Ammonia and Castor Care at two levels of each.

(Government Farm, Bullia, 1946-47)

System of replication.—4 randomised blocks of 11 plots each.

Plot size.—1/30th acre.

Treatments.—(1) No marries, (2) Compost 50 N before sowing, (3) Compost 100 lb. N before sowing (4) Sulphate of ammonia 50 lb. N before sowing (5) Sulphate of ammonia 100 lb. N. before sowing (6) Castor cake 100 lb. N before sowing (7) Castor cake 100 lb. N before sowing (8) compost 25 lb. N (before sowing) sulphate of ammonia—25 lb. N (2 weeks after sowing) (9) Compost 25 lb. N (before sowing+castor cake 25 lb. N (2 weeks after sowing) (10) compost 50 lb. N (before sowing)+Sulphate of ammonia 50 lb. N (2 weeks after sowing) (11) compost 50 lb. N (before sowing)+Castor cake 50 lb. N (2 weeks after sowing).

Agricultural operations.—Date of sowing 23-26 November, 1946, date of harvesting: 10-11 April, 1917; date of thrashing: 13-20 May, 1947.

Note.—Due to late sowing the crops was badly affected by wind and rain just at the time of flowering.

SUMMARY OF RESULTS
(Average Yield in lb. per acre)

, , , , , , , , , , , , , , , , , , ,	Grain	Straw				
1. No. Manure	••	••	••		1237	2115
2. Compost—50 lb. N	••	••	••		1470	2280
3. Compost—100 lb. B	••	••	••		1800	3000
4. S.A.—50 lb. N	••	••	••		1620	3000
6. S.A.—100 lb. N	••	••	••		1980	4320
6. Caster Cake-50 lb. N	••	••	••		1200	1440
7. Sector Cake—100 lb. 1	Y	••	••		1275	1809
8. Comp.—25 lb. N + S.	A.—25	lb. N	••		2100	3450
9. Comp.—25 lb. N+cak	o. N	••		1320	1470	
10. Comp-50 lb. N+S.A.	50 lb.	N	••		2010	3120
1. Simp 50 lb. N+cake	50 lb.	. N	••		1650	2760

Grain: Com. —25+S.A.—25; Com. 50+S.A.—50; S.A.—190; Com.—100; Com.—50+Ca.—50; S.A. 50 Com.—50; Com.—25+Ca.—25 Ca.—190; ca.—50, No Manure.

Straw: S.A.—100 Com—25+S.A.—25 Com—50+S.A.—50, Com—100, S.A.—100 Com—25+Ca—50 Com—50 No manure.

Ca-100, Com-25+Ca-25, Ca-50.

Average increase in yield in lb. for every lb. N applied in different treatments

	7	Freatmer	its			Grain	Straw
Compost—50		,	• •	• • • • • • • • • • • • • • • • • • •		6.8	2.8
Compost—100	• •	••	••	••		5.6	8.8
8.A	••	••		••		9.2	17.2
8.A.—100	••	• •	••	••		7.4	22 · 0
Ca.569	••	• •	••	• •		0.0	-F:0
Ca-100		••	••	••		0.38	-3.1
Compost—25+8	.A.—25	••	••	••		17.3	26.
Compost—25+C	a—25	• •	••	••		1.6	-7.1
Comput-50+8	. <b>A</b> .—50	• •	••	••		7.7	20-
Compust-50-1-C	a50	••	• •	• •		4-1	12.

Grain: Com—25+S.A.—25 S.A.—50 Com—50+S.A.—50, Si.A.—106; Com. 50 Com—100 Com—50+Ca—50 Com:—25+Ca—25, Ca—100, Ca—50

Show: Com. 25+8.A. 25 S.A.—100; Com.—50+S.A.—50, S.A.—50 Com.—50+Ca—50 Com.—100 Com.—50 Ca—50; Ca—100; Com.— 25+Ca—25.

Note.—I dividual plot yields in certain cases got mixed up; therefore complete statistical analysis was not possible. But the results on the whole are so apparent that some tentative conclusion are drawn below.

#### CONCLUSIONS.

In both grain and straw compost added at 25 lb. N as basal dressing followed by sulphate of ammonia at 25 lb. N as top dressing produced the maximum yield. In this combination 1 lb. Nitrogen produced 17-3 lb. extra grain and 26.7 lb. extra straw.

Both Compost and sulphate of ammonia increased grain and straw yield and castor cake produced little effect on grain and depressing effect if any, on straw. There was also a proportionate increase in grain and straw with increasing doses of compost and sulphate of ammonia.

On an average 1 lb. of Nitrogen in compost produced 6.2 lb. additional grain and that in sulphate of ammonia produced 8.3 lb. additional grain.

(iii) PADDY: EFFECT OF DIFFERENT DOSES OF TOWN COMPOST.

(Rice Research Station, Nagina, 1946)

Layout.—Six randomised blocks of 4 plots each.

Plot size.-1/59th acre.

Treatment.—(1) No manure, (2) Compost—50 lb. N (3) Compost 100 lb. N and (4) Compost—150 lb. N per acre.

Previous crop.—Paddy fallow.

#### SUMMARY OF RESULTS

		Yield in lb. per acre.	Percent on means.					
No ma	nure				• •	••	1142 · 48	70-11
Compo	st50 lb	. N	••	• •	••	••	1521 - 28	111-35
Compo	st100 l	b. N.			••		1672 - 31	111:41
Compo	st—150 I	b. N	• •				1668 - 60	111-17.
Moan	••	••	••		••		1501 · 04	100-00.
6.E.		••	••	••	• •		142.75	9:51.

#### Coclusion

100 and 150 lb. N are significantly better than control. 1 lb. N (100. lb. N level) yields  $5 \cdot 3$  lb. additional grain.

(iv) Wheat: Comparison of Different doses of Town Compost.
WITH DIFFERENT DOSES OF FARMYARD MANURE.

(Government Farm, Bharari, Jhansi, 1946-47).

System of replication.—6 randomised blocks of 5 plots each.

Plot size.-1/60th Acre

Treatments.—(1) No manure (2) Compost—50 lb. N, (3) Compost 100 lb. N (4) Farm yard manure—50 lb. N and (5) Farm yard manure 100 lb. N.

Agricultural operations.—Sown on 5-12-46.

Previous crop Maize manured with town compost at 40 lb. N. per acro.

Note.—The crop was badly affected with rust. The yield on the whole was

consequently very poor.

29.

# SUMMARY OF RESULTS

# (Average yield in lb. per acre.)

	T'reatment								
1. No Manure	• •				450	2100			
2. Comp-50 lb. N		••		•• {	500	2200			
3. Comp—100 lb. N	••	••			540	2300			
4. Farmyard manure—	'	480	2120						
5. Farmyard manure—1	100 lb. N	••	••	••;	520	2200			

# SUMMARY OF RESULTS FOR LEVELS

(In lb. per acre)

# A. Grain

					Mean Yield	Per centage of general mean
on	• •		• •		450	90 · 36
50 lb. N	• •	••		••	490	98 · 39
100 Lb. N			• •	••	<b>53</b> 0	107.42
General mean		1 141			498	100.00
Cratical differ 5% )	ence of cont	rol with	others	••	39 · 2	7.87
1% }	••		••	••	53.6	10.76
0.1% }			••	• •	72.8	14.65
Critical differ	ence of othe	ers	••	••		
5% }	• •	• •		••	32.0	6.45
1% }	••	••	••	••	44.0	8.8
0.1% }	• •		••		59.2	11.8

B. Straw

					Mean yield	Percentage of the general mean.
0N		• •			2100	96 · 26
50 lb.N	• •	• •	• •		2160	99.01
100 lb. N	• •	••		•• ;	2244 · 8	102.90
General Mean	••	••	••	••	2181.6	100.00
Critical difference	e of Con	trol with	others.	1		
5%	• •	• •	• •		74 • 4	3.41
1% '}		• •	• •		101 · 6	4.66
ر %0∙1	••	••	• •		137 · 6	6.31
Critical difference	e of othe	rs	••		•	
5%	••	••	• •		60.8	2.79
1%	••	••	••		83 · 2	3.81
0.1%	••	• •	• •		112.8	5-17

# SUMMARY OF RESULTS FOR MANURES (In lb. per acre)

				Critical	difference at	
	Compost	Farm Yard manure	General Mean	5% 1%		0.1%
Mean Yield in lb. per sore Percentage of General mean	3244·8 101·93	2160·0 98·07	3202·4 100·00	60·8 2·76	83·2 3·76	112·8 5·12

#### Conclusions

In the case of grain the mean yield for no manure is significantly lower than the mean yields for 50 lb. N and 100 lb. N also. Thus no manure has given the significantly lowest yield. 50 lb. N has given an increased yield of 40 lb. per acre over no manure, and 100 lb. N an increased yield of 40 lb. over 50 lb. N treatment. There is thus a progressive increase in yield due to increase in dose of manure.

In the case of straw the mean yield for no manure is not significantly different from the mean yield for 50 lb. N, but is significantly lower than the mean yield for 100 lb. N. Also the yield for 50 lb. is significantly lower than that for 100 lb. N. Thus 100 lb. N produces the maximum yield which has increased 144.8 lb. over no manure.

The summary of results for manures shows that the mean yield for compost is significantly higher than that for farm yard manure, this excess being actually 84.8 lb. per acre.

- 3. Trials carried out during 1947-48
- (i) Paddy—Effect of different doses of town compost.

(Rice Research Station, Nagina)

#### SUMMARY OF RESULTS

Treatments				Yield in Lbs. per acre	Percentage of mean.	
No. manure		•••		1697 · 7	80+3,	
Compost-50 Lb. N.			]	2018.8	95.4	
Compost-100 Lb. N				2314.6	109.4	
Compost—150 Lb. N	• •			2429 · 9	F14·9	
Mean	• •			2115.0	300.0	
S. E	• •			123.9	5.9	
Critical difference	••	••	••	373.8	17 - 7:	

Conclusion:—Compost at 100 and 150 lb. N. are significantly better than control. 1 lb. N. at 100 lb. N. level yields 6·17 lb. and at 150 lb. level 4·9 lb. additional grain.

### (ii) Brinjuls.—Effect of different doses of town compost (Government Normal School, Moradabad)

# SUMMARY OF RESULTS

Yield in lb. per aere.

			No. of brinjals picked	Total weight of brinjals in lb.
No. Manure	••	••	 49760	21148
Compost-40 lb. N.	••	••	 167940	27320
Compost—60 lb. N	••	••	 248800	65932
Compost—80 lb. N.		••	 435400 -	1,32,175

#### MADHYA PRADESH

- 1. TRIALS CARRIED OUT DURING 1946-47
  - (i) Field trials on cultivators' fields.

Field scale trials on the farms of Rao Saheb Bhagwat and Vallabh Das Thakurdas at Amraoti gave the following yields of ground-nut per acre:—

1	Yields i	in lb.
Treatments	Rao Saheb Bhagwat's fields*	Vallabh Das Thakurdas fields
1	Pods Lb.	Pods Lb.
1. Unmanured	435	1,089
2. Manured with 10 cart-loads of dung manure	490	1,306
3. Manured with 10 cart-loads of town compost	693	1,796

<sup>\*</sup>Soil was light red sandy loam.

The above statistics showed that application of town compost at 10 cart-loads per acre was very beneficial for ground-nut crop.

At Anjangaon-Surji (Berar) the yield of juar was recorded as follows in the field of Yesu Sangahi:—

			Lb.
1.	Unmanured	• •	250 lb. per acre.
2.	Manured with 10 cart-leads cattle dung manure		320 lb. per acre.
3.	Manured with 10 cart-loads town compost		380 lb. per acre.

At Pandharkawda (Berar) it was observed that unmanured crop of chillies in the fields of Nanaji Krishnaji remained stunted (9" to 1 feet) and did not give any yields. The crop manured with town compost was 3-3½ feet in height and gave an outturn of 1½ khandis. Narayanrao Kale of Basin reported 100 per cent. extra yield of paddy due to application of 10 cart-loads of town compost per acre as against 400 lb. per acre of unmanured crop.

Mr. Chatarsingh of Khandwa reported that the keeping quality of tomatoes manured with town compost was superior to that of unmanured and that he was able to export the crop to Agra. His crops of tomato, cabbage and chillies received much appreciation in the Khandwa exhibition. At the Cattle and Agricultural Show of Harda, Shirjut Jiyalal Mali was awarded prizes, for cauliflower, pumpkins, potato and oranges grown on town compost.

#### 2. Trials carried out during 1947-48

(i) Potato.—There were two experiments on potato and both have given highly significant results. The yield data of these experiments are given in the following table:—

Yield in lb. of potato under various manurial treatments (Figures in brackets show per entage increase over control)

Treatments	Govt. farm, Cahindwara			Government farm Adhartal	
1. Unmanured or control	Lb. 4,266	(100)	Lb. 2,980	(100)	
2. Town compost at 30 cart-loads per acre before monsoon	6,586	(154.3)	2,933	(98·4)	
3. Town compost at 15 cart-loads per acre before monsoon and 15 cart-loads at planting in furrows	″s,0 <b>92</b>	(195.9)	4,533	(152·1)	
4. Cattle manure at 30 cart-loads per acre before monsoon	7,532	(176 · 5)	2,666	(89 · 4)	
5. Cattle-manure at 15 cart-loads before monsoon and 15 cart-loads at planting in furrows	8,240	(193·1)	4,133	(138 · 6)	
6. Town compost at 30 cart-loads per acre before monsoon plus top dressing with groundnut cake at 5 maunds per acre  7. Town compost at 15 cart-loads before	8,292	(1 <del>94</del> ·3)	6,266	(210-2)	
monsoon plus 15 cart-loads at plant- ing plus top dressing at 5 maunds ground nut cake	9,572	(224·3)	6,399	(214.6)	
8. Groundnut cake at 15 maunds per acre at planting	6 012	(140.9)	5,199	(174·4)	
9. Ammonium sulphate at 460 lb. per acre at planting	5,132	(120 · 3)	4,400	(147 · 6)	
Critical difference at 5 per cent. level	250.0	(4.9)	68.0	(2·2)	

The results of the last year's field experiments on potato were not significant. This year's results clearly show the importance of application of bulky manures in potato cultivation particularly in the case of Chhindwara experiment in which it is noted that fertilizers even in single large sizes (treatments 8 and 9) are not as effective as bulky manures (treatments 3 and 5). From these two experiments it is observed that the best method of manuring potato seems to be application of 15 cartloads per acre of compost or cattle-manure before monsoon followed by

application of 15 cart-loads per acre of these bulky manures at the time of planting in furrows supplemented with a dose of 5 maunds of cake or 150 lb. ammonium sulphate.

(ii) Residual effect of Compost manure.—Plots of two 1946-47 experiments were reserved for residual effect trial. The statistical analysis of the yield data of the residual effect trial showed that only one experiment had a general significance. The percentage yield of juar in the first year (1946-47) of this experiment on the Besim Farm and the percentage yield of groundnut in the second year (residual 1947-48) with the average percentage yield of two years is given in the following table:—

Treatments	Yield of juar as percentage of manured treatment in the first	Yield of groundnut as percentage of unmanured treatment in the 2nd tear	Average percent- age yeield of the produce
(1)	(2)	(3)	(4)
1. Unmanured or control	100	100	.100
2. Town compost at 10 cart-loads per acre	112.7	121.2	116-9
3. Town compost at 20 cart-loads per acre	146.3	135.5	142-4
4. Cattle manure at 10 cart loads per acre	115-1	108.5	111.8
.5. Cattle-manure at 20 cart-loads per a cre	105 · 1	111.6	108-3
6. Groundnut cake at 5 mds per acre	124.6	92.1	108.3

It will be seen from the above residual that residual effect of bulky manures in the year following the application of manure is considerable. In the case of fertilizers like oil-cake a certain amount of exhaustion is noted in the second year, and therefore, whenever bulky manures are to be compared with fertilizers it is necessary to take into consideration the residual effect of the former in the year following their application. Town compost seems to have a better residual effect than cattle-manure in this particular case.

(iii) Statistics from cultivator's fields.—Field experiments on Government farms have their own limitations. Because of careful management, the soils of Government farms have been graded up and have much higher fertility level than those of the cultivators' fields. It has been the experience generally that results on cultivators' fields have shown a greater response to compost manure.

The Assistant Biochemist, Wardha, has reported the following results. The yield of paddy at Sewagram Ashram—E.B. 17 manured at 10 cartloads of town compost per acre was 1,680 lb. as against 240 lb.per acre in the unmanured one. The increase in yield is 600 per cent. At the same place yield of onions in 1/40th of an acre plot manured at 25 cartloads of town compost per acre was 255 seers as against 240 seers when manured with 25 cart-loads cattle manure per acre. The outturn of juar in the village Warud in the fields of Shri Nanaji Burande were as follows. The actual yields in 1/40th of an acre were recorded:—

Treatments	Outturn in lb. in 1/40th of an acre	Yield per acre in lb.
1. Town compost at 8 cart-loads per acre	54	2,160
2. Cattle-manure at 8 cart-loads per acre	48	1,920
3. Unmanured	45	1,800

The unmanured land was a fallow for about 20 years and has been brought under cultivation for the last five years.

The Assistant Biochemist, Harda, reports that Fundilal, Mali of old Itarsi who manured a 3/4th of an acre plot with 15 cart-loads of town compost got 72 kudaws (1½ mani) of paddy which was 24 times the seed sown. Ramprasad Dhimar of Hoshangabad got almost double produce of water melons in the river bed cultivation in Narmada by use of town compost as against unmanured plots.

The following statistics have been collected by the Assistant Biochemist, Nagpur. The crop cutting experiment in the fields of Pandarinath Naik of Saoner showed that the yield of juar manured at 7 tons of compost per acre was 1.016 lb. per acre as against 605 lb. in the unmanured fields. At Jamtha it was observed in Shri Athawale's fields that yield of juar manured with town compost at 10 cart-loads per acre was 950 lbs. per acre as against 260 lbs. in the unmanured fields. Shri Soni of Mauza Parsodi has reported a yield of 30 maunds of arum in a plot of 120' × 75" (0.3 acres) manured with 25 cart-loads (75 cart-loads per acre) as against 10 maunds in the unmanured plot in the previous year.

The following statistics have been reported by the Assistant Biochemist Raipur, on paddy obtained by crop cutting experiments:—

Nan e of culti- vator	Village	Type of soil	Type of manuring	Yield in lb. per acre	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
1. Shri Abhaya- lal. 2. D	Chhota Boria. Do.	Kanhar Do.	Rasna khat (village washings). Town Compost at 10 cart-loads per acre.	1,830 1,780	Irrigated Pad- dy. Do.
<b>3.</b> Do.	Do.	Do.	Town compost at 10 cart-loads per acre plus 200 lb. ammonium sul- phate.	1,855	Do.
4. Do. 5. Shri Page	Do. Bha'gaon	Do. Matasi	No manure Rasna khat plus 8 cart-loads compost	1,155 2,800	Do. Irrigatedt paddy (results reported by the cultivator himself).
6. Do	Do.	Do.	Rasna Khat	1,400	Do.
7. Do 8. Do	Do. Do.	Do. Do.	8 cart-loads compost 8 cart-loads cattle	1,120 840	Do. Do.
9. Do	Do.	Do.	Manure. No manure	700	Do.
10. Do	Do.	Kanhar	8 cart-loads compost	952	Unirrigated
11. Do	Do.	Do.	8 cart-loads cattle	612	paddy. Do.
12. Do	Do.	Do.	No manure	350	Do.
13. Shri Phool- ing.	Deopuri	Do.	10 cart-loads compost	1,526	Irrigared pad-
14. Do	Do.	Do.	per acre. 12 cart-loads cattle manure per acre.	1,782	dy. Fields in pre- vious 1 year manured with
15. Do.	Do.	Do.	No manure	1,175	Irrig ted Pad-
16. Shri Phool- sing	Deopuri	Bhata	8 cart-loads compost per acre.	970	dy. Unirrigated paddy.
17. Do	Do.	Do,	No manure	822	Unirrigated paddy (fields manured in the previous year).
18. Shri Sukh-	Chhota Boria.	Bhata	8 cart-loads compost	977	Unirrigated
19. Do	Do.	Do.	per acre. 8 cart-loads compost plus 100 lb. sup-	957	paddy. Do.
20. Do	Do.	Do.	orphosphate.	<b>795</b>	· Der i

The Assistant Biochemist, Gondia, has reported that Hemrajsiag of Hirdemali got a yield of 4,800 lb. of potato per acre manured with 40 cartloads per acre as against 3,840 lb. in unmanured fields. Ramsevaksing of Gongaon reported a yield of 5,200 lb. per acre of potato manured with 30 cart-loads of town compost as against 4,000 lb. in the unmanured fields. A yield of 2,640 lb. and 2,200 lb. of paddy per acre manured with eight-cart lods of compost as against 2,200 lb. and 1,750 lb. in the unmanured fields was reported by Surajbe, Patel of Sankhua and Bhadupote of Pratapbagh, respectively.

The Assistant Biochemist, Jubbulpore reports that Labheram Sharms of Jubbulpore got a yield of 3,200 lb. paddy per acre manured with 24 cart-loads of compost per acre as against 1,750 lb. in the unmanured fields.

#### 3. Trials Carried out during 1948-49

## (i) Paddy-Labhandi Farm, Raipur.

1	Labhar	ndi Farm, (R	aipur)
Treatments .	Yield in lbs. per acre	Yield as percentage of control	Extra yield per lb. of nitrogen applied
1. Unmanured	676	100	
2. Town Compost at 20 lbs. Nitrogen per acre-	773	114-4	4-8
3. Town Compost at 40 lbs. Nitrogen per acre	1,039	153.8	9-1
4. Farm Yard Manure at 20 lbs. Nitrogen per acre	860	127 · 2	9-2
5. Farm Yard Manure at 40 lbs. Nitrogen per sore	1,154	170.7	11-9
6. Ground Nut Cake 10 lbs. Nitrogen per	778	115-9	10-1
7. Ground Nut. Cake at 20 lbs. of Nitrogen per acre	971	143.6	14-3
8. Ammonium Sulphate at 10 lbs. of Nitrogen per acre	752	111.3	7-6
9. Ammonium Salphate at 20 lbs of Nitrogen per acre	934	138-1	12-9
Critical difference at 500 level	11.2		

It is observed that town compost and cattle dung manure in double dose of 40 lbs. of Nitrogen per acre have given better yield than application of Ammonium Sulphate and Ground Nut Cake in both 10 and 20 lbs. Nitrogen doses. Last year also town compost and cattle dung manure in

double dose of 20 cart loads per acre had given better yield as compared to application of Ammonium Sulphate. It may hence be concluded that the availability of Nitrogen in cattle dung and compost manures for paddy is somewhat more than 50% of the total Nitrogen based on cent. percent. availability in fertilizers. The extra yield of Paddy per lb. of nitrogen applied in the bulky manures cattle dung and compost is not very much less than that of fertilizers. This is contrary to observation of other research workers who have observed it to be only 50% that of fertilizers. These experimental plots will be reserved for residual trials for next year.

(ii) Wheat.—All the three experiments on wheat have given significant results and yield results of these are given in the following table:—

Yield in lbs. of wheat per acre under various Manurial Treatments.

(Figures in brackets show yield as percentage of control)

Treatments	Pow	Powarkheda		Adhartal		Saugor	
1. Unmanured	737	(100)	325	(100)	667	(100)	
2. Town compost at 20 lbs. of Nitrogen per acre	752	(102)	355	(109 · 2)	737	(110.5)	
3. Town compost at 40 lb. of Nitrogen per acre	762	(103·3)	335	(103 · 1)	787	(117.9)	
4. Farm Yard Manure 20 lbs. of Nitrogen per acre	748	(101 · 5)	345	(106·1)	757	(113 · 5)	
5. Farm Yard Manure at 40 lbs. of Nitrogen per acre	848	(115-0)	363	(111 · 7)	800	(119·9)	
6. Ground Nut Cake at 10 lbs. of Nitrogen per acre	848	(115-0)	420	(129 · 2)	787	(117.9)	
7. Ground Nut Cake at 20 lbs. of Nitrogen per acre	185	(133-6)	457	(140-0)	820	(122 · 9)	
8. Ammonium Sulphate at 10 lbs. of Nitrogen per acre	890	(120-7)	447	(137 · 5)	753	(112.9)	
9. Ammonium Sulphate at 20 lbs. of Nitrogen per acre	953	(129-3)	558	(171 · 7)	807	(120 · 9)	
(ritical difference at 5% level	I	0.2		6-2		6.07	

The bulky manures, cattle dung and compost, though showing significantly higher yields as compared to no manure treatment, have given extra yield of the order of 1 to 5 percent. at Powarkheda and Adhartal farms. The fertilizers as a contrast have given much higher yields 30 to 70% above control particularly at 20 lbs. Nitrogen application. The bulky manures generally have not given good results on wheat. On Saugor Farm the contrast between bulky manure and fertilizers is not

very marked. The higher doses of Nitrogen have also not given comparatively much higher yields for the manures as fertilizers employed in the experiment on Saugor Farm.

(iii) Potatoes.—There were two experiments on potato and both have given significant results. The yield data of these experiments are given in the following table:

Yields in maunds of Potato under various Manurial Treatments.

(Figures in brackets show percentage increase over control)

· ·	Governi Fai Adha	rm	Governmental Farm Chhindwara.	
1	Ma	unds	1	Maunds
1. Unmanured	$22 \cdot 2$	(100)	106 • 4	(100)
2. 30 cart-loads of town comp st before Monsoon	32 · 1	(144·6)	120.3	(114.8)
3. 30 cart loads of town compost at Planting	37.0	(166·4)	119-6	(112-4)
4. Town Compost 15 cart load before Monsoon and 15 cart-loads at planting	33.4	(150-4)	111.3	(104-7)
5. Town compost 15 cart-loads before Monsoon and Ground Nuf Cake at 5 maunds at Planting	34.9	(157-2)	126.7	(118-9)
46. Town Compost 15 cart-loads before and 15 cart-loads at Planting plus 120 lbs. of Ammonium Sulphate	36.5	(164 · 4)	144 · 1	· (135·5)
<ol> <li>7. Town compost 15 cart-loads before monsoon and 15 cart- oads at planting a id 10 mau ids Grou id Nut Cake</li> <li>8. Town compost 15 cart loads before monsoon and 15 cart-loads plus 240 lbs. of Ammonium Sulphate</li> </ol>	29·8 42·3	(134·2)	133·3 160·8	(125·4) (151·1)
9. Town compost 30 cart-lails tracther with 5 maunds ground nut cake at planting	34.5	(155 · 4)	131 1	(123·1)
10. Town Compost 30 cart-lords after Monsoon with 10 maunds Ground-nut Cake at planting in furrows	33.2	(150·0)	142 · 1	(133·7)
Critical difference at 5% level	0 18		0.8	

The application of Town Compost gives an increase of 14—15 maunds potatoes per acre. The increase is appreciably greater when town compost is supplemented with ammonium sulphate.

(iv) Residual Effect of Compost.—Four experiments conducted during 1947-48 which showed general significance, were reserved for residual effect trials during 1948-49 and were put under crop next in rotation. These trials were conducted at Government Farms. 1. Raipur, 2. Powarkheda, 3. Saugor, and 4. Yeotmal. Out of these four trials, Yeotmal Farm did not give significant results. Results of the Experiments at Raipur, Powarkheda and Saugor Farms are given in the following table, showing yields of Paddy, Wheat and Barley in lbs. per acre.

Residual effect trials

	Government Farm Raipur	Government Farm Pow.rkheda	Government Farm Sauger
	Paddy	Wheat	Bactoy
Unmanured or control	360	510	1033
Town compost 10 cart-loads per acre	45	567	1166
Town compost 20 cart loads per acre	590	617	1237
Farm Yard Manure 10 cart-loads per acre	<b>54</b> 6	581	1200
Farm Yard Manure 20 cart-loads per acre	755	648	1240
Ground Nut ('ake 4 maunds at Powarkheda and Saugor and 5 maunds at Raipur Town	730	578	1260-
Ammonium Sul phate 120 lbs. per acre	417	520	1120
Critical Difference at 5% level	15.4	7.3	15-2

The following table shows the effect of these manures as percentages of the yield of the unmanured plots both in the first year of application as well as in the second year (residual effect).

Treatments	Yield as percent- age of unmanured treatment in the first year	Yield as percentage of un nanured treatment in the second year	Average percentage yield of the pro- duce over two yn ra
Raipur Far	M (PADDY)		
I. Unmanured	100	100	100
2. Town comp. at 10 cart-lads	103 · 6	125.3	114-4
3. Town comp. at 20 cart-1), ds	110-4	163 - 9	137 · 1
4. Farm Yard Manure at 10 Cart-loads	102.9	151.7	127.3
5. Farm Yard Manure at 20 Cart-loads	114.7	209 · 7	161.7
6. Ground Nut Cake at 5 mds. per acre	98 · 45	202 · 8	150-6
7. Ammonium Sulphate, 120 lbs	109.8	115.8	112.8
Powarkheda	FARM (WH	EAT)	l .
1. Unmanured	100	100	100
2. Town comp. at 10 cart-loads	107.7	111.1	109-4
3. Town comp. at 20 cart-loads	109.7	120.9	115-3
4: Farm Yard Manure at 10 cart-loads	102.7	113.9	108.3
5. Farm Yard Manure at 20 cart-loads .	106.4	127-1	116.7
6. Ground Nut Cake at 4 mds. per acre	72.7	113.3	193.0
7. Ammonium Sulphate 120 lbs	131-1	101.9	116.5
Saugor Fai	M (BARLBY)	•	1
1. Unmanured	.   100	. 100	100
2, Town comp. at 10 cart-loads	. 118-1	112.8	115-4
3. Town comp. at 20 cart-loads	. 110.0	119.7	114-8
4. Parm Yard Manure at 10 cart-loads .	. 124 · 4	116.1	120-9
5. Farm Yard Manure at 20 cart-loads .	. 83.8	119.9	101.8
6. Ground Nut Cake at 4 maunds per acr .	. 82.2	121 - 9	102-0
7. Ammonium Sulphate 120 lbs	. 80.3	108-4	94.3

The residual effect of town compost and cattle dung manure in the second year has come out clearly in all the experiments, particularly against the fertilizer Ammonium Sulphate. Ground Nut Cake has also shown a significant residual effect.

(v) Statistics from cultivator's fields.—It is seen in many cases that the observations made on the cultivator's fields show a better response to urban compost than those taken on the Government Farms. This is mainly due to the fact that the soils at Government Farms have been graded up to a high level of fertility due to continuous manuring year after year. Observations made during this year on Juar, Paddy and W heat have been recorded below:—

#### JUAR

Name of cultiva- tor	Place	Type of soil	Rate of manuring per acre	Yield of Kadbi per acre Lbs.	Yield of grain per acre Lbs.
1. Shri N. R. Rajurka	Amraoti	Medium	3 cart-loads of town compost.	7 <b>6</b> 00	280
2. Shri S. M. Bole	Morshi	Heavy Black	8 cart loads of town compost.	6000	642
3. Do	Do.	Do.	8 cart-loads of cattle manure.	5680	608
4. Do	Do.	Do.	No manure	5200	512
5. Shri H. A. Ajnere	Amraoti	Light Black.	8 cart-loads of town compost.	4960	400
6. Do	Do.	Brought under cultiva- tion first time.	No manure	1540	80
4. Nathusingh	Burhanpur		16 cart-loads of town compost.	••	1440
Do	Do.		No manure		740

#### PADDY

Name of cultivator Place		Place	Rate of manuring per acre	Yield per sere in lbs.	Romarks
1. Shri Matadin wal.	Agar-	Khandwa	10 cart-loads of town compost	2420	Unirri- gated
Do.		Do.	Unmanured	1200	Do.
2. Manakchand	Pra-	Harda	li cart-loads of town compost	1920	Do.
tapseth Do.		Do.	Unmanured	680	Do.
3. Dinabandhoo	••	Tatibandh (Raipur)	6 cart loads	2920	Do.

WHEAT

Name of cultivate	or		Place	Rate of manuring per acre	Yield per acre in lbs.
1. Matedin Agrawa	1		Itarsi	13 cart-loads	960 Lbs.
2. · Do.		••	Do.	No Manure	520 Lbs.
3. Chandulal			Jubbulpore	31 cart-loads	960 Lbs.
4. Pooranlal			Do.	30 cart-loads	1120 Lbs.
5. Chandaman			Panagar	60 cart-loads	1280 Lbs.
6. Bhudhu			Do.	36 cart-loads	1920 Lbs.
7. Bhayyalal	• •		Do.	13 cart-loads	915 Lbs.
8. Chaitram			Do.	27 cart-loads	960 Lbs.

Increase in yield ranging from 25 to more than 100 percent are observed on various crops as a result of the use of town compost.

WEST BENGAL
TRIALS CARRIED OUT DURING 1947-48

# (i) Paddy—Chinsurah Farm.

Manure		Grain yield in mds. per acre	%increase over control	Straw yield in mds. per acre	%in- crease over control
1. Control		 30.2		46.4	
2. Town compost @ 40 lbs.	N.	 33 · 1	9.60	51.3	10.56
3. A. F. Y. M. @ 49 lb. N.		 35.7	18.21	53 . 4	15.00
. 4. Cowdung 60 lbs. N.		 36.2	19.87	58.4	25.86
5. Town comp. 60 lb. N.		 36.9	22.18	65.1	40.30
6. A. F. Y. M. 60 lb. N.		 37.4	23 · 84	59.2	27.59
7. Cowdung 60 lb. N.		 38.5	27 · 84	68-5	47.63

# (ii) Paddy-Chinsurah Farm-Experiments with Aman Paddy.

			Paddy		Straw	
			Maunds	%in- er ase over Control	Maunds	% in- crease over control
Control	. •	•••	27.9		44.2	
Town comp. 40 lb. N.	••		32-1	15.05	48.0	8.60
Town comp. 60 lb. N.			37.1	32.97	66 - 2	49.77

The extra yield averages about 8—12 lb. Paddy and 25—30 lb. straw per lb. of nitrogen.

APPENDIX C.

URBAN COMPOST SCHEME—STATISTICS AND PRODUCION AND DISTRIBUTION DURING THE QUARTER ENDING 31-12-1949.

Serial No.	State	No. of centres opera- ting	Vol. of compost prepared during the quarter	Vol. of compost sold during the quarter	Total vol. of compost sold during the year from 1st April	of unsold
			Cu. ft.	Cu. ft.	Cu. ft.	Cu. ft.
1	Ajmer-Merwara	4	1,00,135	58,240	1,40,640	6,07,975
2	Bhopal	2	1,21,000	1,21,700	1,21,700	1,64,300
3	Bihar	25	2,33,051	54,715	1,61,248	16,42,798
4	Bombay	118	23,15,680	7,78,690	41,25,030	65,58,790
5	Madhya Pradesh	110	9,06,050	5,55,375	12,36,050	40,67,675
6	Delhi	4	5,18,340	5,18,340	8,66,265	••
7	East Punjab	24	7,02,780	5,68,640	8,93,040	12,81,260
8	Hyderabad State	37	1,00,061	1,57,495	2,44,919	6,29,401
9	Madhyabharat	49	4,86,275	3,36,675	5,96,575	15,83,3^5
10	Madras	115	19,64,736	10,20,485	40,77,178	51,42,510
11	Mysore State	77	3,30,498	1,48,596	21,81,490	6,94,244
12	Orissa	14	1,27,501	18,350	49,425	4,13,628
13	Travancore Cochin	21	1,13,398	98,400	3,(5,244	2,40,178
14	Uttar Fradesh	210	44,18,639	37,93,370	91,97,680	98,82,800
15	West Bengal	28	2,22,255	1,20,148	2,25,320	10,24,586
16	P. E. P. S. U.	1	14,000	30,160	30,160	49,840
	Total	838	126,75,090	83,79,379	244,51,964	339,40,290

### NOTE

This Bulletin is intended for the information of officers engaged in operating Compost Schemes, in order to keep them posted with the latest scientific and practical developments taking place in their field, in India and abroad. It must be understood, however, that the views expressed in this Bulletin are not binding on the Government of India.

# COMPOST BULLETIN

# (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

Issued by the Director of Compost, Ministry of Agriculture,
Government of India

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# COMPOST BULLETIN

Vol. 3, No. 2, June 1950

# 1. National Tree Planting Week.

India is probably the only important agricultural country where manure is burnt for fuel on a big scale. It is estimated that nearly 50% of the cattle dung produced in the country totalling in all about 800 million tons, (fresh weight) is converted into fuel cakes and burnt off each year. If only the above manure could be saved and made to serve its normal purpose of replenishing soil fertility, our food production could be in creased by about 5—6 million tons, enough to wipe out the present food deficit of the country.

As long ago as 1893, Dr. J. A. Voelcker, the Agricultural Expert who was invited by the Government of India to report on agricultural conditions in this country, drew attention to the extent to which valuable dung manure was being burnt away. He rightly declared in his Report: "I have no hesitation whatever in saying that amongst cultivators the reason why they burn dung is that they have no wood; and that if wood could be made cheap and accessible to them, there would be an enormous increase in the amount of manure available for the soil". Again he says; "The one way in which alone this question of permanent importance can be met is by supplying more wood and thus setting free the manure for use on the land .... First and foremost, Government must supply wood for agricultural purpose, to take the place of the cowdung now being burnt".

The real reason why the rural masses are suffering seriously at the present day from lack of fuel, is not that there is no land for establishing fuel plantations—in fact there are in India nearly 100 million acres under forests and in addition there are about 80 million acres classified as uncultivated wasteland, which if properly developed, would be more than sufficient to supply the entire fuel demands of India and render unnecessary the burning of any portion of cattle dung. Formerly, every village had a 'common' land which supplied fodder, and fuel, but in recent times, along with the disintegration of the village community and the Panchayat System

most of the above 'common' lands have become barren patches which do not grow anything. That the soil of such common lands is good, is shown by the fact that the private lands which surround the common lands are under cultivation and yield in most cases good crops.

What is needed is a three pronged drive to eradicate the present evil habit of burning cowdung, directed in the following channels, viz:—(a) Government should adopt a bold policy of fuel utilization of all waste lands in the country for the supply of fuel and fodder; for this purpose an integrated plan of action should be framed and executed involving the planting of trees on all such waste lands including the village common lands, canal and river bunds, empty spaces along-side railway tracks, and in the compounds of all Government owned or leased buildings, in addition to the vast blocks of uncultivated waste lands scattered all over the country; (b) side by side with the above major programme operated under Government management, the voluntary labour and resources of private individuals all over the country should be mobilised in a vast non-official effort to plant millions of tree seeds or seedlings in all vacant spaces in and round about their houses, in village surroundings, in farm hedges etc; for this purpose a Tree Planting week should be observed as a National Festival organised and stimulated by the foremost national leaders of the country; such a drive can probably achieve even greater results than what the limited financial resources of the Government could accomplish within the next few years; (c) thirdly, legislation should be introduced in all States prohibiting the burning of cowdung in notified areas where alternative fuel is available; a start can be made in this matter by banning the import of cow dung cakes or their sale in all municipal and town areas in the country.

The Government of India have already taken action under item (b) above, by calling for Tree Planting Weeks to be observed during the Independence Day Celebrations on August 15th of 1948 and 1949. The Special Appeal that was issued in this connection in July, 1948 by the then Minister for Food and Agriculture, the Hon. Shri Jairamdas Daulatram, has already appeared in the September 1948 (Vol. 1 No. 3) issue of the Compost Bulletin. But it has been generally felt that August 15th is too late for successful planting work, since the montoon (rainy) season starts in most parts of the country early in July. It has therefore been decided by our present Minister for Food and Agriculture, the Hon. Shri K. M. Munshi

that the National Tree Planting Festival should be observed from this year onwards from 1st—7th July, 1950. In his address to the Indian Merchants' Chamber at Bombay on May 23rd, 1950, the Hon. Minister declared "One of the causes of the recurrent short fall in rain is the ruinous and irresponsible action in indiscriminate felling of trees. During the last two years, because of the fear of land being taken away by Zamindari law or integration, hundreds of thousands of trees have been felled, making fallow land barren. During the War the British felled lakhs of trees to make timber. We must therefore, intensify our forest policy and grow more trees. Water must be regulated and husbanded for agriculture. We must begin now."

## The Hon. Minister declared :-

"The annual national tree festival 'Vana Mahotsava', will be celebrated from July 1 to 7. During the week, all over the country, trees will be planted in tens of thousands, for we want a crore of more trees by the end of 1951. All Governments, the railways and all institutions, public or private, and all men, women and children should co-operate.

"We must be forest-minded once more and make this a regular national festival. Vana Mahotsava should be a festival of joy. During this week women and children should plant trees, water trees, repair to the forests and gardens and like "men of trees" in modern Canada should honour and study and worship the trees.

"I want you patriotic businessmen of Bombay, and through you the businessmen of the whole of India, to give me two things to fight this new war of freedom. I want 50 tree one boring well from each one of you. It is immaterial where this work is done—in your compound, in your native place, in holy Banaras, in Mathura in Delhi or in Somnath".

The Government of India have also issued a Special Appeal to State Governments in the matter which states:--"The rapid denudation of tree growth from hill sides and cultivated plains has led to devastating floods, erosion of soil, progressive diminution of rainfall and general deterioration of climatic conditions. The stage has already reached which compels the cultivator to divert his farmyard manure from his field to his hearth, resulting in progressive impoverishment of the fertility of the soil.

"To arrest this wanton destruction of vegetable cover of the soil, it seems necessary to arouse consciousness among the masses regarding the value of trees and instil in them an adoration for these silent sentinels mounting guard on mother earth. With a view to make the populace tree-minded, appeals have been issued from time to time by the Ministry of Agriculture enjoining everyone to plant and protect trees. Advantage has been taken, in the past, of the wave of enthusiasm generated on the occasion of the celebration of the Day of Independence. Experience gained during recent years has revealed that tree planting done in the middle of August, when the Independence Day falls, suffers from a grave handicap viz., the loss of half the growing season which commences in July when monsoon sets in over the greater part of the country. It has been accordingly decided to declare the first week of July as the National Tree Planting Week. This week should be recognised as an annual national festival for planting of trees, and should be called Vana Mahotsava.

"A countrywide drive is indicated to popularize this festi-It is imperative that collective sentiment should be harnessed to this scheme. Fairs, gatherings, worships of trees. forest festivals should therefore be planned. To give a fillip to the movement, it would be of advantage if ceremonious planting is undertaken by national leaders, men of eminence. Heads of Departments, and district officials. It would be advisable to set up a standing committee at the headquarters of Government to direct the campaign for planting trees. Committee should include members of legislature with whom should be associated heads of various development departments such as Forest, Agriculture, Irrigation, Railways, Revenue etc. It will be the responsibility of this committee to issue necessary instructions to various districts and departments in respect of the celebration of this annual festival and to arrange for the establishment of a central seed store and nurseries for the distribution of seeds and seedlings. A nominal charge may be made for the supply of plants. What is got for nothing is considered good for nothing. The State Forest Departments should issue leaflets giving detailed instructions regarding what, how, and where to plant trees in various localities. Trees may be selected for their aesthetic value, for shade, fruit, timber and fuel they yield. Every one should be requested to lend a hand. Plans should be drawn up to plant trees in :-

<sup>(1)</sup> Compounds of Government buildings, court-houses, rest houses and camping grounds.

<sup>(2)</sup> Compounds of private bungalows.

- (3) Public gardens, burial grounds, and other open spaces.
- (4) Canal, roadside and railway lands.
- (5) Schools and College compounds.
- (6) Village wastelands.
- (7) A tree or two in the fields of cultivators.

It is not enough to plant trees and leave them to their fate. Their after care and protection, until they get beyond the reach of cattle, is of utmost importance. Tree guards made out of thorns provide a cheap and effective means of protection. An occasional check on the progress of trees planted by touring officers will prove of inestimable value in ensuring their establishment."

In connection with the Tree Planting Festival, a leaflet assued by the Bombay Government, giving particulars of different trees and plants that can with advantage be planted by the farmer would be found useful and is reprinted in Appendix 'A' of this Bulletin.

# 2. Further Legislation for Compost Production.

The text of the East Punjab Conservation of Manure Ordinance 1949 (East Punjab Ordinance No. 16 of 1949) which was promulgated by H. E. the Governor of East Punjab on 20th July, 1949, has been already given in Compost Bulletin Vol. 2, No. 3, pages 32-37. The above Ordinance has since been replaced by legislation (East Punjab Conservation of Manure Bill 1949) which was introduced in September, 1949. The text of the Bill is almost similar to that of the Ordinance.

In the Statement of Objects and Reasons of the above Bill the East Punjab Government say:—

"As a result of constant cropping, the East Punjab soils have become greatly impoverished and yields of crops are abnormally low as compared with those of foreign countries. The soils require to be enriched which can be done either by application of artificial fertilizers (on the importation of which India already spends crores of rupees every year) or by proper use of Farm Yard manure, which is really the most important source for the recuperation of the soil fertility. In this province, however, this valuable product is not being properly conserved.

It is stored in the form of heaps in open ground. Being thus exposed to sun, rain, hot and dry winds, and wind storms, a good deal of the valuable ingredients thereof is lost. For proper conservation it must be stored in suitable pits as recommended by the Agricultural Department. Even though conservation of manure in pits does not involve any great expenditure and the propaganda in its favour has been carried on by the Agriculture, Rural Reconstruction and Health Departments for decades, yet the pitting of Farm Yard manure has not been taken up on an extensive scale. As this resulted in a colossal waste of national wealth, it was considered necessary to stop this through legislation both in the interest of proper conservation of Farm Yard Manure and the health of the nation. As the matter was very urgent and the legislature was not in session, the Governor in exercise of the powers conferred on him by section 88(1) of the Government of India Act 1935, promulgated the East Punjab Conservation of Manure Ordinance 1949, for this purpose. Under Section 88(2) of the said Act the Ordinance will cease to operate at the expiration of six weeks from the reassembly of the Legislature, but it is necessary that the powers conferred by the Ordinance should be retained beyond that date and with this object in view the present Bill has been drafted ".

While commenting on the original Ordinance, it was pointed out in the Compost Bulletin (Vol 2, No. 3, page 4) that the main difficulty that would be met within enforcing the terms of the Ordinance would be the considerable delay that at present occurs in procuring land needed for compost making in villages. The East Punjab Government have now brought up an amending Bill, the text of which is given in Appendix B in order to rectify the above drawback. In the Statement of objects and reasons of the amending Bill they state:— "This Bill is designed to empower the Provincial Government for speedy acquisition of land and to vest all powers under the Act in the Revenue Officers, instead of the Officers of Agriculture Department, as it is the Deputy Commissioner who has been made responsible for the success of Grow More Food Campaign".

Under the Punjab Municipal (East Punjab Amendment) Ordinance 1949 the East Punjab Government have notified the

following Municipal Committees for purpose of converting their refuse material into compost manure:—

(1) Amritsar City (2) Ferozepore City (3) Jullundur City (4) Hoshiarpur (5) Ludhiana (6) Abohar (7) Gurdaspur (8) Batala (9) Tarn Taran (10) Hissar (11) Karnal (12) Ambala City (13) Phillaur (14) Pani Pat (15) Jagadhri (16) Sonepat (17) Bhiwani.

The Patiala and East Punjab States Union Government have also issued an Ordinance for amending the Municipal Act in force in the P.E.P.S.U., with a view to compelling municipalities to convert their urban refuse into compost manure. The text of their Ordinance is given in Appendix 'B'.

The Compost Legislations passed by the State Governments of Bombay, Bihar, Orissa and Mysore have already been given in the issue of Compost Bulletin Vol. 3, No. 1 (March, 1950).

# 8. Sewage Utilization for Agricultural Production.

A preliminary Note explaining the considerable scope that exists for increasing agricultural production by utilisation of sewage and sullage water for purpose of irrigation and manuring has already appeared in the Compost Bulletin Vol. 2, No. 2 (June 1949) issue. In the above connection, it was pointed out that nearly 500 million gallons of sewage and sullage effluent per day are available for utilisation and these contain in addition to so much of water, about 36,400 tons of nitrogen equivalent to about 182,000 tons of ammonium sulphate and worth about Rs. 5 crores per year.

The Government of India took the iritiative in helping State Governments in preparing suitable Schemes for utilizing the above huge quantities of sewage and sullage water, by appointing in May 1949, Dr. R. P. Talati as Sewage Utilisation Officer. A special Note prepared by Dr. Talati on the subject is printed in Appendix C to the present issue of the Bulletin, and gives particulars of the position as it stands today.

The scope for sewage utilisation varies no doubt, considerably from State to State depending on the number of towns which have been fitted up with the sewage system or even with surface drainage. Out of total number of 4,000 towns in India only 25—30 are fitted up with underground sewerage and about 270 others are fitted up with surface drainage, showing the considerable leeway which India has to make up before she can some up to the standards of European or American countries.

The number of urban centres is greatest in Madras, Uttar Pradesh and Bombay and hence the major portion of the Schemes for Sewage Utilisation will be concentrated in the above areas. The Governments of the above 3 States will have to devote as much attention to Sewage and Sullage utilisation as they are doing to other Schemes for increasing agricultural production. In view of the specialised technical nature of the work relating to sewage utilisation which requires a combination of engineering, public health, chemical and agricultural knowledge, it is necessary that for the purpose of preparing suitable plans and putting them into operation, a trained Sewage Utilisation Officer should be appointed in each of the above three States and his services should be made available free of cost to the Municipalities concerned in laying out and operating Sewage Utilisation Farms.

# 4. Compost Development in Madras.

The Madras Government constituted in October, 1948 a Provincial Compost Development Committee with the Hon. Minister for Agriculture as Chairman and the Commissioner for Food Production, Secretary to Food and Agriculture Department, Secretary Local Self Government Department, the Director of Agriculture, Inspector of Municipal Councils and Local Boards, the Registrar of Co-operative Societies, the Director of Public Health, the Economic Adviser to Government, the Provincial Firka Development Officer, one Municipal Commissioner and 2 non-officials as members. The Provincial Compost Development officer is the Secretary to the Committee. The Committee has been holding its meetings every quarter, reviewing the progress made and making recommendations for further development of compost production and distribution.

One of the special recommendations of the above committee based on the report of a Special Officer appointed for the purpose, was for fixation of a uniform price of Rs. 0-10-10 per cart load (25 c.ft.) or Rs. 1-5-8 per ton of urban compost at all municipal centres. The Government accepted the above recommendation and have informed the municipalities that in special cases where the cost of production is higher than the "Control" rate, the loss incurred by the municipality upto a limit of 25 per cent above the control rate would be met by a special grant for the purpose.

The Committee at its last meeting held on 24th March 1950, also prepared plans for conducting a pilot survey in Chinglepet

District in order to assess the present level of manure production in villages by the random survey method; and recommended to Government the grant of Rs. 6,000 for employing special staff for the above purpose.

Quite recently, based on the recommendations of the Compost Development Officer to the Government of India, the Madras Government have decided to extend the Compost Scheme to 360 Panchayat Board areas, which possess Executive officers and have necessary facilities for compost making. As a result of this drive it is expected that about 50,000 tons of additional compost would be produced at the above centres. The Scheme will be operated through the agency of the District and Tehsil Agricultural Officers and under the technical supervision of the Provincial Compost Development Officer.

# 5. Preparation of Blood-meal.

Attention has so far been concentrated in this Bulletin on major matters like the composting of Urban and Rural refuse which run into millions of tons per year and of sewage and sullage which run into hundreds of millions of gallons per day. But while the above sources of manure preparation are being utilized, there is no reason why attention should not be paid to smaller matters wherein there is appreciable wastage at present. One of these relates to the utilization of slaughter house wastes.

The number of animals being slaughtered has considerably decreased since the close of the War and several State Governments have passed legislation prohibiting the slaughter of useful cattle. Even then, there are several hundreds of slaughter houses spread all over the country where goats, sheep and other animals are slaughtered in order to provide meat for the market. It is necessary that all the bye-products and waste materials of slaughter are properly utilized.

In the above connection, the following note prepared by Shri Valunjikar. Bone Meal Adviser to the Ministry of Agriculture, recommending the preparation of bloodmeal from slaughter house blood collections, would be read with much interest. It is estimated that about 25,000 tens of bloodmeal could be prepared in the country by adopting the method. "Slaughter house wastes consist mainly of blood, tankage, bones, horns and hoofs. The blood and tankage are invariably left behind in the slaughter house while bones, horns and hoofs are taken away by the butchers. It has been observed that at the present time the blood is allowed either to run into some drain or is dumped along with the tankage in pits. Both the

practices are wasteful from the agricultural point of view, as blood contains about 13 to 15 per cent and the tankage about 3 per cent of nitrogen which is entirely lost. The nitrogen from blood is a protein nitrogen and contains residuary qualities. It is therefore considered more valuable than the nitrogen from artificial fertilizers. The average amount of blood per cattle and per goat or sheep slaughtered is estimated at about 24 lbs. and 2 lbs. respectively. It is proposed to utilize this waste for manurial purposes to further our grow more food campaign. This will at the same time help to keep the slaughter house clean and add to its sanitary condition.

## COLLECTION OF BLOOD

"The first step necessary in this connection is to arrange for systematic collection of blood. In many places the slaughter houses are of katcha materials and in a delapidated condition. They do not provide any means for collection of the blood which flows into drains. It would indeed have been better if these were remodelled entirely. But since that is not possible only the minimum modification of construction of channels has been suggested as sketched below. (vide Fig. 1)

A channel should run through the entire length of the floor and should be 6" deep and lined with China Clay or comented pipe with a slope of 1 in. in 12 ft.

"There should be two especially constructed tanks at the end of the channel one for blood and the other for tankage. The capacity and dimensions of each tank will vary from municipality to municipality and will be based upon the maximum number of animals slaughtered during the winter season which is the peak season for the slaughter-houses. (The average amount of blood available per cattle and per goat is about 24 lbs. and 2 lbs. respectively and the average quantity of tankage available per cattle and per goat is 16 lbs. and 4 lbs. respectively). The tanks should be fitted with moveable wireguaze covers of 20 mesh to stop fly nuisance. The slope of the floor also should be generally towards the drain so as to allow the maximum amount of water to flow in the drain. Cemented flooring would be preferable but if any slaughter house has at present stone or brick flooring it may be allowed to remain but all the joints and crevices must be perfectly cemented. The blood collected in these tanks will be taken out, put in a drum mounted on bullock cart or any other suitable vehicle and taken to the processing place for further operation.

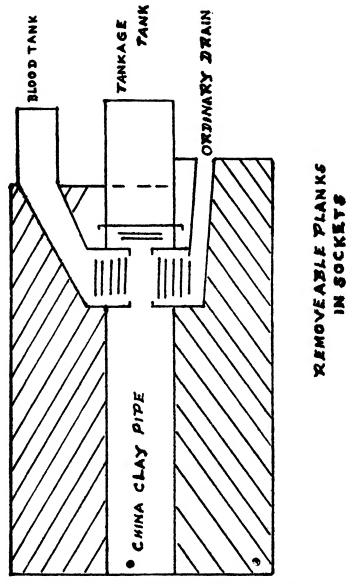


Fig. 1. Showing recommended lay-out for slaughter-house flooring.

## PREPARATION OF BLOOD MEAL

"Fresh blood forms a red, thick liquid, which, in contact with air, soon separates into two parts—the solid fibrous part, which forms a clot, and the liquid part, which constitutes a serrum. The blood brought from the slaughter-house will be taken out, screened through a 20 mesh sieve in a big cauldren and the serum or the liquid portion and the clot formed will be separated.

"The clot will then be spread in thin layers in iron pans put on an oven with a mild fire below and hot sun above. It will be scraped and turned several times to ensure quick drying. After drying; the clot becomes brittle. It will then be powdered in a handmill or disintegrator if the quantity is large and according to facilities available locally, bagged and stored in a dry place. This will give nearly 2/3 of the total bloodmeal available. The rest 1/3 will be secured from the serum.

The serum or the liquid portion may be treated in the following three ways:—

- (1) Simple boiling till all the colloids are entirely coagulated. This may take an hour or two according to the heat given. This process involves fuel expenses and possibilities of burning, charring or over-heating the substance, entailing a loss of some nitrogen and the quality of easy solubility.
- (2) Addition of some coagulating agent which is not or is the least harmful to the soil, is easily available and can be easily handled and comparatively cheap. Some suggestions are (i) dilute sulphuric acid (ii) Ferric sulphate (iii) alum.
- (3) Addition of lime. One hundred parts of blood are mixed with 1 to 3 parts of quick lime, which converts into a solid cake which can be dried in the air without any purification. The resultant mixture falls down to a fine inodorous powder. This process has an additional advantage of having a small quantity of lime thus improving its fertilizing quality.

## Tools and Implements.

				_		Rs.	
1. 20 mesh sieves 2 ft. $\times$ 3							
Blood-tank at the slaugh	hter ho	ouse and	the other	r for			
screening the Blood)					20	0	0
2. Galvanized drum 10 gallo	on capa	city1 p	iece (To ca	irt the			
blood from the slaughter					15	Ú	0
3. Shallow iron pans oft. >	< 4 ft.	8 pieces	• •		200	0	0
4. Covers for the pans			• •		80	0	0
5. Scrapers—2 pieces		• •			10	0	0
6. Two wheeled cart to mou	int the	drum			100	0	0
7. Bullock or Buffalo (one)					150	0	0
8. An iron cauldron	• •	• •	••	• •	125	0	0
					700	0	0

"The work may be managed and organized by the municipality. A contract may be given to a local chamar to collect the blood and make it into dry meal at a fixed rate. At Lucknow a chamar does this work of collecting and carting the blood and preparing it into meal at the rate of Rs. 4 to 5 per maund of dry blood-meal. The blood-meal thus received may be sold to the Agricultural Department. Or the whole work may be given on contract to any individual charging some reasonable royalty for the blood, with the condition that the blood-meal produced must be first offered to the Agricultural Department at a price fixed by it. A Provincial organizer may be found necessary for the first year to organize this work in all the municipalities. He could however do other allied works such as organization of bone-meal industry, dead-cattle disposal scheme and others.

# COST OF PRODUCTION

"It is very difficult to assess the cost of production in such matters. It is not an independent industry but is a subsidiary one with those who deal in hides, bones and others or who deal in flaying and tanning and it can only succeed as a subsidiary industry. It is therefore preferable to fix the price of the blood-meal at which the agriculturist can afford to purchases taking into consideration its manurial value. Some rough idea, however, can be given. An ordinary Chamar may easily handle about one maund of fresh blood every day. No bullock cart may be found necessary to cart the blood from the slaughter house to the processing place as he can bring it H130MofAgri.

on head loads. I do not take into consideration the price of the fresh raw blood which is negligible. One maund of fresh blood may yield 1/3 blood meal. If we calculate Rs. 2 to 2/8 as the wages of the labouring chamar at the present market rate, the labour charges for producing I maund of blood-meal will be between Rs. 6 to 7-8. You can add to this about Rs. 0-8-0 to Rs. 0-12-0 as the price of the coaugulating agent such as lime, alum or any other. The cost of fuel may also be negligible as the quantity required is very little. Still for calculations' sake I take it as about annas 8 to 12 per maund. cost of blood-meal may range from 7 to 9 rupees per maund at the door of the *chamar*. He can produce additional bloodmeal also with the same labour. But I have taken one maund fresh blood because even in comparatively small places that much quantity can be available. I therefore think that the cost of production may not exceed the above mentioned. places it can be much less and in small places where it could not be a whole time occupation it will also be less. " (Note by Shri Valunjikar)

# 6. Cost of Production of Town Compost

Compost Schemes have now been in operation in different areas for the last 4 or 5 years and it is possible to obtain a satisfactory picture of the cost of production, actually being incurred by municipalities in preparing compost manure. This information is important in fixing a price for Urban Compost, which would cover the actual expenditure incurred by the Municipality in preparing the compost and at the same time prove a reasonable price which the purchaser would be willing to pay.

While calculating the cost of production of compost, the expenditure incurred by the Municipality for collecting the refuse from the houses and roads and their transport outside Municipal limits should not be included, since this work is being done for the sake of public health, under the provisions of the Muni-

cipal Act and not for the sake of manure preparation.

Only the expenditure incurred at the Compost Depot, e.g., capital expenditure in laying down roads, digging trenches etc. and recurring expenditure like wages of sweeper-labour, maintenance of the Depot and purchase of implements should be included in the Compost account. As regards capital expenditure (e.g. roads and trucks), it is reasonable to recover the above expenditure in about 8 years time by an annual debit of 12½ per cent to the Compost Production Account.

Data on the above lines were obtained from 80 compost centres which are working in the Punjab, Utter Pradesh, Bihar, Bombay, Madras, and other States, and the expenditure incurred under different major heads have been calculated per ton of compost manure produced. The results obtained have been given in Appendix D and show that on the average, the expenditure per ton of compost works out to about Rs. 1-5-0 under capital expenditure, Rs. 1-9-0 under labour charges and Rs. 0-4-0 under depot maintenance charges; including 12½ per cent recovery of the capital expenditure each year, the cost of production of compost manure comes to about Rs. 2 per ton.

The Madras Government appointed last year, a special officer to examine among other things the question of fixation of a uniform price for the compost manure prepared by municipalities in that State After examining the cost data obtained from several Municipalities, that officer worked out an average figure of Rs. 0-10-10 per cart load (25 cu.ft.) or Rs. 1-5-8 per ton. but apparently the recovery of capital expenditure was not included in the above data.

It would therefore appear that a price of Rs. 2 per ton (50 c<sup>-1</sup>.ft.) of sieved manure would be a reasonable price both for the Municipality and for the purchaser. In the interests of widespread use of compost manure and in order to prevent exploitation of the cultivators by the Municipalities concerned, the above uniform price may be fixed by State Governments for all Municipalities in their area. In special cases, where Municipalities make out a case for a higher cost of production, they may, by special sanction, be allowed to charge the higher rate or they may be given a Government subsidy to cover the loss incurred by sale at the controlled price.

As regards transport charges, the experience obtained in several States where Government trucks are being used, show that the transport expenses within 8-10 mile radius range from Rs. 3 to 4 per ton, including loading and unloading charges. Thus, the total cost to the farmer including price of manure payable to the Municipality and transport to his farm will come to Rs. 5-6 per ton. Town Compost is largely used in intensive cultivation of vegetables, potatoes, fruits, and other market crops, and as shown by the data already presented in the compost Bulletin (vide issues of the Bulletin, Vol. 1, No. 3, Appendix A; Vol. 2 No. 2, App. B; Vol. 3 No. 1, Appendix B; and also the tabular statement given on p. 7 of Bulletin Vol. No. 3), an extra yield of 4-5 mds. of vegetables and potatoes valued at about Rs. 20 are obtained per ton of urban manure applied. It is therefore evident that it is quite profitable to the farmers carrying out intensive cultivation to purchase urban compost at Rs. 5-6 per ton (delivery at their farms).

The above price is much cheaper than the rates prevailing in England and U. S. A. where urban compost sells at Rs. 15-30 per ton for delivery at the farms; and the Americans are able to use the manure at the above rates and sell their produce in the Indian market. The Indian farmer can retain the above profit for himself if he could be persuaded to purchase and apply more manure to his land.

# 7. Composting of Sugar Factory Wastes in Uttar Pradesh.

A note indicating the vast potentialities for compost production from cane trash on sugar cane estates and farms has already appeared in the September 1949 (Vol. 2, No. 3) issue of the Compost Bulletin. The Uttar Pradesh is the leading State in the matter of sugar production and possesses nearly 2 million acres under sugarcane. Nearly 5 to 6 million tons of cane trash should be available for compost making on the farms where the cane is stripped and cut before transporting them to the factories. But in addition to the trash, available on the farms, there is plenty of material available at the sugarcane factories which are at present wasted and which could conveniently be composted e.g. filter press cake, bagasse, and that portion of the molasses which is not utilized for industrial purposes. The Cane Commissioner in Uttar Pradesh estimates that nearly 10 lakh maunds (about 37,000 tons) of Compost manure were prepared from the above factory wastes during the year 1949-50. As regards the method in which the compost is prepared and its quality, he gives the following details:

- (1) The preparation of compost from press mud and cane trash has been done mostly in sugar factory gate areas so far. The compost is prepared in pits.
- (2) According to local availability of space, pits of varying sizes, mostly 16 ft. × 10 ft. × 5 ft. are dug in series. Raw material consisting of press mud, cane trash, cattle dung, urine earth, parking ground sweepings etc. are collected and stored on one side of the pit.
- (3) The filling of the pit then takes place. This is done in layers. A layer 9 in thick of press mud is spread and over it cane trash, cattle dung, cattle urine earth etc. are laid upto a total height of 1½ft. Over this is sprinkled slurry water prepared from dung and effluent water of the factory, if available. Similar layers each 1½ ft. deep are laid on top of one another till the pit is filled.

- (4) The pit is filled to a height of about 1½ ft. above ground level. It is then properly sprinkled with water e.g., effluent water from the factory and then a layer of earth is spread over in order to fully cover it.
- (5) The proportion of press mud, cane trash etc., in the pits is not strictly fixed. It is governed by the quantity of each material available for composting.
- (6) The covered pit is then left over for the ingredients to rot and decompose for 10-12 weeks. Within this period, the whole material undergoes decomposition and the finished product comes out as a dark brown odourless mass ready to be applied to the field.
- (7) In some cases, where late filling is done in April or so and the mass in the pit does not rot properly within the period, the covered pit is left over as such and opened after the rainy season is over.
- (8) The factory yard compost thus made has been analysed from different places, and generally the percentage of nitrogen amounts to 0.8 to 1.2 per cent.

# 8. Urban Refuse Composting in New Zealand.

The issue of the "Compost Magazine" (or New Zealand) Jan. Feb. 1950 contains an interesting article by Mr. D. M. Robinson, President of the New Zealand Humic Compost Society, giving particulars of the compost work that has been started by the Auckland Municipal Council. This work is the result of a long period of agitation carried out by the Auckland Suburban Drainage League since 1946, urging that the Municipal wastes should be converted into manure. City Council subsequently authorized its designing Engineer, Mr. A. T. Simmons, to examine and report on the composting plants that were in operation in England. Mr. Simmons submitted a favourable report in October 1946, and the City Council decided to give a trial to a pilot scale mechanized compost plant and sanctioned a sum of £1,900, out of which Government bore 50% as grant. Though the amount sanctioned was quite insufficient to establish a fully mechanised plant, Mr. Simmons was able, "by ransacking the Council's yards and stores, by modifying and adapting old machinery and by ingenious improvisation " to construct a plant at a cost of little over £2,000, which started functioning a few weeks before Christmas, 1949." The population of Aukland is about 150,000 but the plant is a pilot scale model which could deal with only a fraction of the daily outpu of refuse and sludge.

It is expected that reliable estimates of the cost of production of manure would become available after the plant has been working for some months, but in the meanwhile the details of the mechanised Compost Pilot Plant as given by Mr. Robinson would be read with interest by our readers:—

## COMPOST PILOT PLANT:

"The Compost Pilot Plant has been designed and constructed so as to be capable of complete operation by one man, and to this end mechanization has been adopted to the maximum possible extent. The purpose of this is to reduce operating costs, of which labour is a substantial portion, to a minimum.

"The plant consists of the following essential elements:—Refuse receiving hopper, mechanically open ted drag board, shaker screen, flail, picking belt, magnetic pulley, crusher, elevating conveyor belt, composting silo, dropside truck on light tram rails, sludge pump and sludge meter. As an adjunct to the foregoing there is also a small incinerator for burning discarded portions of the refuse not utilised for compost.

"Raw refuse from residential areas is delivered in the normal refuse trucks from a delivery ramp into the refuse receiving hopper. From this hopper the refuse is discharged mechanically by the drag board on to the shaker screen. shaker screen fulfills the dual function of transporting the material along its length towards the conveyor belt, and during its passage removing unwanted portions of the refuse. to the fact that the public has been educated for a long time to wrap their refuse in newspapers, it has been necessary to install a flail, which breaks down these parcels during their passage along the vibrating screen. The material emerging from the vibrating screen falls on to the picking belt, alongside which stands the operator. The whole of the plant is operated electrically, and all the control switches are grouped on a switchboard panel at the side of the operator so that instant control is attainable of any or all of the elements in the plant.

"As the material passes in front of the operator on the picking belt he removes therefrom large ferrous articles, non-ferrous articles, glass and other inorganic materials which it is undesirable should enter into the composting silo. Small ferrous articles are removed automatically by the magnetic pulley at the discharge end of the picking belt, and the balance of the material discharges into the crushers, which pulverise

it and discharges on to the elevating belt. This elevating belt transports the crushed raw refuse into the composting silo, and a swivelling chute, controlable by the operator from his position by the picking belt, enables partial distribution of the refuse in the silo. After complete processing of a day's input of raw refuse, the operator proceeds to the silo and, after completing the uniform distribution of the input material, floods the same with sludge. The control switch for the sludge pump is located in a position accessible from the cat-walk round the top of the silo, and there is also a meter which enables the operator to accurately measure the amount of sludge used at any time.

"The composting silo itself is constructed of steel and is of a special design which, to the knowledge of the designer, is original. The floor of the silo consists of a battery of 12 inch water pipes cut in half along the diameter and closed at the ends with welded plates. The longitudinal edges of the pipes have been ground off to a cutting edge, and each pipe is supported on spindles in bearings. Provision has been made for lagging the silo with timber if necessary.

"The method of removing compost material from the silo at the end of the first stage of maturity consists of simply turning each pipe through one revolution by means of a ratchet lever, which has the effect of removing the bottom 12 inch layer of material and depositing same in the dropside truck underneaths. This means, in effect, that the first stage of the fermentation process, which occurs in the silo, is a continuous process in which there is always present in the silo some material infected with active bacteria. Furthermore, the amount of handling involved is minimised. The amount of material removed per day is capable of close control by varying the method of turning the pipes and the interval between each successive turning.

"After discharge of compost into the dropside truck the latter is pushed by hand along the tram track and discharged by hand on to the maturing heaps, where the second stage of fermentation takes place. Any desired degree of turning can be effected in this second operation and subsequently in the heaps themselves.

"During the process of fermentation in the silo, the moisture content is capable of suitable control, the means of exercising this control being by maintaining suitable temperature. Sludging can be carried out at any time, and to any extent needed, and the amount of sludge is metered. A special thermometer has been purchased which gives accurate temperature, recordings, and the thermometer is of a design which enables temperatures to be read at the silo. Similarly, temperatures may be obtained in the maturing heaps, and provision has been made for watering these heaps as may be necessary. To date temperatures in the silo have run up to 160 degrees, Fahrenheit, but it is expected that higher temperatures will be reached when the process is running continuously. The sludge is obtained from a large communal septic tank owned and operated by the Housing Department and serving the housing settlement adjacent to Point England Road. This means that domestic sludge of a good quality is used.

"Complete analytical records are continously kept concerning incoming refuse and compost at various stages of fermentation, sufficient to enable a case history to be available regarding any particular heap of matured compost. These records will be co-ordinated with the results of scientifically controlled field tests carried out with the compost by the Department of Scientific and Industrial Research. The records and field tests, thus co-ordinated, should provide the required information as to the agricultural, horticultural or silvicultural value of the compost as manufactured from Auckland's residential garbage and sludge without additives."

# 9. Compost Development in Bihar.

There are 60 municipalities in Bihar, which could produce in all about 150,000 tons of compost manure. In addition, there are about 50,000 villages where there is huge wastage of manure of the order of about 5 million tons per year partly due to the prevalent habit of burning cowdung for fuel and partly due to negligence in not collecting the refuse material available in their houses, cattle-sheds, village surroundings and farms. Bihar Government have been operating for some years past an Urban Compost Scheme, under which about 30,000 tons of manure are being prepared at present. They have very recently sanctioned a Village Compost Scheme under which an intensive drive is being carried out in villages for digging pits and preparing compost. The aim is to dig 100 compost pits and prepare about 18 tons additional manure in each village. A target of 300,000 tons was fixed for the year 1949-50 and 12,40,000 tons for the year 1950-51.

Bihar has met with special difficulties in executing its Compost Programme, which has accounted for its slower progress as compared to the adjoining State of Uttar Pradesh. For one thing, the people of Bihar have not been accustomed to the use of town compost and have naturally evinced considerable prejudice against the above manure. This necessitated the transfer of the Urban Compost Scheme from the Department of Public Health to that of Agriculture in 1948, after which an intensive propaganda drive has been carried out in the villages round about urban centres and much of the prejudice has been now overcome.

The Compost Development Officer to the Government of India visited in April 1950 several of the urban centres in Bihar and submitted proposals for increasing urban compost production to a level of 100,000 tons during 1950-51. This requires the advance of loans to municipalities for purchase of motor trucks for refuse collection and for purchase of lands needed for establishing Compost Depots. Government help was also needed in several cases for expeditious requisitioning of land needed for the above purpose. On the distribution side, it is necessary that Government should operate a fleet of trucks (say about 10) at the bigger centres, where contractors rates are high or they are not forthcoming.

As regards the Village Compost Scheme, the soils of North Bihar (north of the Ganges) are highly fertile, being alluvial soils; but the experience of farmers and records obtained on Government Farms have shown that the soils are becoming in several areas alkaline and the yields are getting poorer year by year. The addition of organic manures like Compost would evidently be the best antidote against further deterioration of the above soils. South Bihar soils are definitely poorer and They respond readily to applications are red sandy loams: of manures. There is therefore great need for an intensive drive in the villages to increase their manure production. in other parts of India, the cultivators of Bihar also neglect to conserve cattle urine. Demonstrations of the improved methods of compost making should be carried out at each circle or Sub Divisional head quarters and all the available Government Staff in the Sub Division viz. Revenue, Agricultural and co-operative Officers should be trained in the improved methods of manure preparation, so that they could organize similar demonstrations in all villages in their jurisdictions.

Another special feature of Bihar is the rapid spread of-water hyacinth which has now spread as far west as Muzaffar-pur. In view of the humid conditions and good rainfall in North Bihar, the pest promises to become as serious a problem in that area as it is in West Bengal. Immediate attempts should be taken to eradicate the pest with the cooperation of the Gram Panchayats and non official public. Possibly the most economic way of eradicating it is to collect the same from ponds, canals, bhils, etc. and to convert it into compost manure, as is being successfully done in Orissa under a special drive started for the purpose.

Then, again, Bihar possesses vast potentialities for compost production from cane trash in sugarcane farms and from factory wastes like pressmud, bagasse etc. at the site of the cane factories. Work on these lines has been started with good results in U. P. where it is estimated that about 10 lakh maunds of compost have been produced during 1949-50 by the Cane Factories from their factory wastes alone. Bihar has nearly 10 lakh acres under cane and can show good results in the matter of compost production from cane factory wastes. more important that cane factory wastes is the large quantity of cane trash left on the farms when the cut cane is stripped before being loaded for transport. It is estimated that the 10 lakh acres under cane in Bihar can prepare nearly 30 lakh tons of cane trash compost. This is a huge quantity which would help to increase appreciably the yield of the rice crop which generally follows in rotation after cane in the above areas.

# 10. Compost Work in Australia.

The enthusiasm generated by the work of the New Zealand Humic Compost Society and the example of the Compost work started by the Auckland City Council seems to have exerted their influence in Australia, as shown by a recent report (vide the "Compost Magazine", Jan.-Feb., 1950) that the Freemantle Municipality have started erecting a Compost Pilot Plant which will deal with 50 tons of garbage per week—which is a fraction of the total quantity of garbage collected in the town. The details of the proposed plant as given in the "Victorian Compost News" are as follows:—

"In addition to the refuse, 10-15 cubic yards of sewage sludge will be used as an activator, and the resultant compost will be sold to farmers and market gardeners. It is estimated that the cost of producing the fertilizer will be £1-6/- per ton, and it will be sold at £2-10/- per ton.

"After the original wastes have been separated into organic and inorganic materials, the organic residue will be pulverised by machine, carried by conveyor belt and spread in layers in the composting bays, garbage and sludge alternating in the proportion of approximately three of garbage to one of sludge, until there is a depth of five feet. A thin sprinkling of lime or crushed limestone will be spread over each layer. After fermenting for three or four days, the material will be removed to maturing bays for approximately three months."

### APPENDIX A

TREE PLANTING FOR THE FARMER.

(BULLETIN ISSUED BY THE BOMBAY GOVERNMENT.)

#### Introduction.

With the recent heavy demands on all forest resources due to the War, both in Government forests and malki lands, and with the increasing density of population, we may expect a continuing demand for wood for all purposes. Even a few trees on a farm considerably help the domestic economy of the farmer and save him from the necessity of paying cash for some of his essential requirements. An intimate relation exists between forestry and agriculture in the use of the soil. If all the land on the farm were fertile there would be little need for forestry i.e. tree planting. Usually some portions of the land will be too poor to grow farm crops. Forestry has to do with the utilization of such poor land. It aims to grow a crop of useful trees where it is impossible to utilise the land for more valuable farm Forestry and agriculture thus go hand in hand in the use of all the land on the farm. Due to improvidence and neglect, such wise use of the land is exceptional. It is hoped that this brief note will stimulate interest and will help those who are eager to undertake tree planting.

The tree planting drive is particularly indicated in the dry tract of the Province and it is fortunate that most of the existing Better Farming Societies, who may take an interest in this matter, are situated in this tract. In the coastal and ghat region where tree growth is naturally present, its conservation should be the main aim. Here the forest estate is better off in the keeping of the Forest Department and the individual agriculturist who may be the fortunate owner of wooded area in this tract is advised to seek information from and to model the management of his property on the Forest Department practice.

The co-operative organisation has great possibilities as a means for the advancement of private forestry. Much may be learnt from developments which have taken place in other countries such as Britain, Denmark, Finland, Sweden, Norway, Canada, U. S. A. and Japan.

# Benefits of tree growth.

One of the most wasteful customs of our agriculturists is to burn cowdung instead of using it for compost manure. If the only use of trees and shrubs were to provide firewood in place of cowdung fuel, that alone would be sufficient justification for growing trees and shrubs. But trees and shrubs offer numerous other benefits as under:—

(1) Leaves, flowers and fruits for various domestic purposes.

Certain leaves are used for foodplates, bidis etc. Flowers are commonly used for worship, dyeing and ornament. India abounds in a variety of trees the fruits of which are an article of diet. There are many plants used in domestic medicine which can be grown in one's own kitchen yard or farmland.

(2) Leaves, dry, or green, for manuring.

Leaves whether dry or green are used in the making of compost manure practically throughout the Province but in some places more wastefully than in other, but all the same the use of leaf manure is well recognised everywhere. In many places the cultivator is unable to obtain his requirements and it will be a great improvement in the economy of farm management if he makes himself self-sufficient in this respect by growing his own trees and shrubs for the purpose.

(3) Leaves for fodder.

Many trees yield excellent fodder leaves and a cultivator can give better feeding to his cattle if he grows his own trees. It is unneighbourly and even illegal to lop trees growing in waste lands and along roadsides.

(4) Wood for building purposes.

There are numerous occasions when a farmer requires wood for repairs to his buildings or even for putting up small structures.

(5) Wood for agricultural implements.

Not all lands are good enough to grow timber for house building but almost any type of land can produce small timber fit for tool handles, axe and spade handles and even larger pieces usually required in farming operations.

(6) Fencing material.

Material for posts, wicket gates, etc., if available on the farm itself will greatly help the farm economy.

(7) Shade and windbreaks.

Everybody appreciates shade for the rest period during the heat of the day. A shady tree or two near the house also helps to keep the house cool. In many tracts the winds are very strong and a belt of tall trees can similarly be very effective in saving the farm soil from being blown away.

(8) Prevention of soil erosion and protection of the water supply.

Trees by their dense crowns protect the soil from the hot sun's rays and are often the direct cause of the presence of springs. The removal of trees around a spring has often been known to dry up the spring. The roots of trees spreading in all directions in the ground serve to prevent the soil from being washed away by rain or floods. Planting trees and shrubs is one of the best prevention of erosion.

(9) Hedges and screens.

Live fences are the most inexpensive of fences and can be maintained with very little labour and no expense. Houses often require screens for securing privacy or to keep off the dust. A live screen is least expensive.

## (10) Reserve fund.

Whether there is a s'ump in the market or not trees keep on growing and it is no loss to keep them in reserve when one is not in need of money. They thus form a growing reserve fund on which the owner can draw at a time of need by cutting and selling the trees. A farm with an adjunct of trees is always more valuable than one without.

## (11) Rejuvenating worn out land.

In some regions and particularly in poor soils worn out land can be made more fertile by allowing it to grow up to forest trees and shrubs. This is the principle on which shifting cultivation is based. After the tree growth has been kept up for some years the soil will have been enriched by the accumulation of leaves and twigs which decay and by the activities of certain organisms that work in the soil. To get the full benefit, however, there should not be much interference by man or animal during the period of rejuvenation.

## (12) Beauty to one's property.

A grove of trees or even a couple of trees on a farm is more pleasing to the eye than a bare farm. A farm should be made attractive and pleasant so that any one would enjoy living in it.

# Where to plant.

A Better Farming Society or a Co-operative Society may purchase or lease Warkas land not required for a more urgent purpose such as grazing or cattle standing ground. It is not the place here to give an idea of the price for purchase or the conditions of lease, as these will depend on the merits of each case but the earnestness of purpose with which a Society may approach Government will not but evoke sympathetic consideration.

Besides such Government land, which may or may not be available in every village, members of the Society can, to be true to their ideal to be "Better Farmers" personally take in terest in planting trees and in encouraging the planting of trees by other villagers (who may not happen to be members of the Society) in places like the following:—

(1) In one's own front or back yard. In the western part of the Province where the rainfall is favourable to tree growth it is usual for most houses to have some land around them where on a kitchen garden together with fruit trees can be maintained. In the drier tracts this is less common or not at all possible. Where a house has even a small space for a shrub or tree it is most useful to put in papayas or plantains (thus utilising the waste water), or a lemon tree (which has many uses in the kitchen as well as for medicine). Perennial flowering bushes and shade-cum-fruit trees like mange can also be put in where soil and space are suitable.

- (2) Along roads and cart tracks, approaches to one's house and as an extension of this activity, along roads and cart tracks approaching the village.
- (3) Waste lands—as a joint effort of the whole Society where the waste land belongs to Government or as an individual effort by a "Better Farmer" where it is his own malki.
- (4) Boundaries of fields of individual members, in friendly rivalry with each other, to show good results in growing fruit, timber or firewood trees. If a field can be made to fill the pot its boundaries must be made to yield firewood enough to cook This can be done by a proper selection of trees to grow and a practice of judiciously lopping them for firewood. Most landlords and tenants will have only their field boundaries to do tree planting on. The length of treeloss field boundaries in the Province must amount to several lakhs of miles. Even if trees are not grown where they are likely to interfere with the field crops, there is scope of growing a vast number As a great deal of tree planting can be done by way of hedges, etc., Schedule A deals specially with the subject, of live hedges, fences, windbreaks and shelter belts, keeping in view other objects as well such as firewood 'upply.
- (5) In addition to the above, a Society should encourage the planting of trees—
  - (1) in compounds of village schools,
  - (2) in compounds of temples, mosques,
  - (3) in compounds of chavdis, cattle pounds.
  - (4) in compounds of cattle standing grounds.
  - (5) near water channels and wells,
  - (6) near bunds of tanks.

If the Society itself plants trees on public places which belong to the whole village in common, then they may try to come to some arrangement with the village Panch as regards the further income from the trees. In most cases, however, a Society is advised to exert its influence in inducing the Panch itself to undertake the planting or the expenses of planting, the Society in the latter case supervising the work.

# Choice of species.

The species selected must suit the soil, the rainfall, the object in view and the care one is able to give it. There are no better trees to plant in any tract than those which grow naturally there, provided they will give the product or use desired. There are also many trees not native to a tract which can grow well outside their habitat and may therefore be planted for a definite purpose.

A list of trees is given in Schedule B which may be useful in making a choice. It will be seen that a majority of them are well known. The only reasons why their planting is not done by farmers is lack of interest and too much dependence on nature to produce everything for them.

## Where to get advice.

At present there are three departments concerned in the encouragement of tree planting. The Rural Development Department is in direct touch with the farmers and their Societies, e.g., Co-operative Societies, Better Farming Societies, etc. The Rural Development Department or individual farmers can directly get advice from two other departments, viz., the Agricultural and Forest Departments. The Agricultural Department maintains several nurseries expressly for the supply of plants to farmers. The Forest Department will supply seed and all advice required in the management of wooded areas. In many cases where the Forest Department has staff stationed in the neighbourhood it will be possible to get personal advice. But in the main the Rural Development Department will, as the department most directly concerned secure all outside help necessary in any particular case.

## Planting time and method.

Generally speaking, sowing of seed should be done sometime before the onset of the monsoon and the planting of whole plants, cutting, etc., should be done when the earth is moist on the onset of the monsoons.

The average cultivator knows enough how to prepare the soil for sowing seed or planting seedlings, so detailed instructions are not required.

F.uit trees will benefit if some bone meal manure is given but wild trees, which the list mostly contains, need no manure and no elaborate soil preparation.

In plantations or lines along boundaries of fields sowings or transplants should not be nearer than 6' apart as a rule. It will be found that after a lapse of a few years, say five to eight, these plants will compete with each other for space and will therefore retard each other's growth. It is then that thinning will have to be carried out in order to give adequate growing space to the trees that are left standing. Such thinnings may have to be done two or three times before the final crop reaches its full development. It will be seen that thinnings also will yield useful material in the form of fuel and small timber.

In the case of fruit trees the seedlings of which are generally more valuable than fuel or timber trees, every seedling has to be ultimately grown to tree size, hence no thinnings are undertaken and the spacing at the start is the same as the final spacing at which the full grown trees are to be maintained.

# Care and protection.

Young seedlings will require weeding, and may require watering particularly in the dry tracts.

Protection against damage by man and beast is highly important as a little carelessness may destroy all previous success in raising seedlings. Where planting has been undertaken by a Society or the Village Panchayat, the problem of protection will have to be solved by the Society.

in its own way with reference to the type of planting it undertakes or encourages. It may be desirable to ensure effective protection by passing an Act on the lines of the Bombay Land Improvement Schemes Act of 1942 or by notifying village plantations as village forests as defined in Section 28 of the India Forest Act.

## Fuel Supply.

Where the object is to ensure a fuel supply special advice will not be amiss. In large plantations or estates the whole area should be divided into as many parts as the number of years it takes the trees to be big enough for felling. Each year one such part should be felled so that an equal amount of wood is produced every year perpetually. The felled area is then planted up or is left to clothe itself by means of coppice. This is roughly the method followed by the Forest Department in the management of fuel forests. In small estates or individual planting on field boundaries this system cannot be followed, for if the few trees are felled once they may yield fuel enough for one or two years and it will be long before other trees take their place. Therefore the practice of lopping is recommended. This consists of cutting only the side branches upto 3" in diameter and never doing so much damage to the tree as to cause its death. It is desirable to keep the leading shoot uncut. The number of trees on a farm should be divided into 2 or 3 lots and each lot lopped in successive years so that lopped years get one or two years for growing new branches. If continuously lopped every year, very soon the trees will lose vigour, refuse to grow new branches and consequently die off. The following species of trees lop well i.e. withstand this type of branch cutting and put forth fresh shoots and branches.

Acacia arabica	M. G.	Babul.
Acacia catechu	K.	Jali.
	M. G.	Khair.
	K.	Shemi, Cachu.
Albizzia amara	G.	Kansar.
	M.	Lellei.
	K.	Tugli.
Anogeissus latifolia	G.	Dhavda.
	M.	Dhawada,
	K.	Dindal.
Melia azadirachta	G.	Nimb.
	М.	Neem.
	K.	Kahibevu.
Butea frondosa	G.	Palas.
	М.	Palas.
	K.	Muttal.
Carissa carandas	G.	Karwand.
	<b>M</b> .	Karwand.
	K.	Kawali.
Dalbergia latifolia	<b>G</b> .	Sissam.
	M.	Shisam, sisu.
	K.	Biti.

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Dalbergia sissoo	••	G. M. K.	Shishma, sisma. Sissoo. Sissoo.
Diohrostachya cinerea	••	G. M. K.	Villentra. Sigamkati. Wadu.
Diospyros montana	••	G. M. K.	Temra. Govinda, lohori. Tendu, hulguni.
Dolichandrone falcata	••	G. M. K.	Medsing. Medsing. Godmurki.
Gymnosporia amarginata	• •	G. M. K.	Henkal. Dutley, chably.
Hardwickia binata		G. M. K.	Anjan. Anjan. Kamra, karachi.
Lagerstroemia parviflora	••	G. M. K.	Bandar. Lendi, bondara. Channangi.
Rhus mysorensis	••	G. M. K.	Amoni.
Wrightia tinctoria	••	G. M. K.	Dudhi. Kalakudi. Kodmurki, kuda.
Zizyphus xylopyrus	•	G. M. K.	Ghutber. Ghorber. Godachi.
.0 0	~ -	.7 . 37 7	, , ,

(G=Gujarati; M=Marathi; K=Kannada).

Many of the above trees and shrubs are well known to agriculturists but in case of any difficulty in getting seed or seedlings, the Rural Development Department will assist.

# Marketing tree products.

Generally speaking, farmers are familiar with the firewood market and they will experience no difficulty in selling at a fair rate any firewood which may be surplus to their wants. But they are usually ignorant about the prices of timber and of such valuable woods as sandalwood. Therefore they should not be in a hurry to harvest and market their timber. Trees are not perishable material like many farm products and they increase in value by their annual growth. Time should be taken to make a full study of the market prices. A marketing society can be of considerable help in this respect. The nearest Forest Officer may also be consulted before disposing of valuable timber and sandal trees.

#### SCHEDULE A.

## Live hedges, fences, wind breaks and shelter belts.

- 1. Objects.—Common objects might be the following, separately or in combination, but the most important consideration must be the provision of adequate supplies of firewood that cow dung can be spared for manure.
  - (1) to divert man,
  - (2) to keep out cattle,
  - (3) to demarcate boundaries,
  - (4) to stop surface wind erosion.
  - (5) to provide high shelter from wind for crops, orchards or buildings.
- 2. Selection of species.—The following is a brief list of species which might meet the object in view. Some of the species will also provide useful products like fibre, fruit, tan bark, etc. Species suitable for firewood are in italics. The numbers in brackets refer to numbers in Schedule B.

For object (1), Adhatoda vasica (4), Agave species (19 to 23), Dodonaea Viscosa (34), Duranta plumieri (35), Euphorbia species (38 to 40), Fleuggia microcarpa (45), Jatropha curcas (51), Lawsonia alba (54), Prosopis juliflora (69), Synademium grantii (77), vitex negundo (85A).

For object (2)—Acacia concinna\* (3), Agave species\* (5), Caesalpinia sepiaria\* (18), (19 to 23), Carissa species (24), Dichrostachya cinerea (31), Duranta plumieri (35), Euphobia species (38 to 40), Gymnosporia emarginata (48), Jatrospha curcas (51), Prosopis juliflora (69), Rhus mysorensis (72), Synadenium grantii (77), Vangueria spinosa (86), Zizyphus sylopyra (90), vitex negundo (85A).

For object (3)—Adhotada (4), Dondonaea (34), Euphorbia species (38 to 40), Lager-stroemia indica (52), Lawsonia (54), Morus species (61), Synadenium (77), vitex negundo (85A) (87).

For object (4)—Agave (5), Carissa (24), Dichrostachya (31), Donæa (34). Euphorbia species (38 to 40) Gymnosporia (48), Rhus (72), Vangueria (86), (87), Zizyphys xylopyra (90). vitex negundo (85A).

For object (5)—Acacia arabica, (1), A. catechu (2). Albizzia species (6 to 8), Eugenia (37), Feronia (41), Hardwickia (49), Largerstroemia parviflora (53), Mangifera indica (55), Melia azadirachta (56), Phyllanthus emblica (63), Prosopis species (69-70), Soymida febrifuga (75), Tamarindus (78), Tamariz (79), Zizyphus jujuba (89), Bambusa vulgaris (3), Dendrocalamus strictus (4). Parkinsonia aculesta (61A).

3. Shelter helts.—These are indicated where the wind velocity is very great and a fairly wide strip of land (50'-60') can justifiably be devoted to the moderating of the wind in the interest of the crops on the leeward of the belt. For an effective shelter belt wedge shaped mass of free growth is recommended as shown below for the main external belt:—

For line A use low shrubs e.g., Agave (5), (19 to 23), Carissa (24), Dichrostachya (31), Dogdonaea (34), Flueggia (45), Gymnosporia (48), Rhus (72), Vangueria (86), (87), Zizyphus xylopyra (90).

For line B use somewhat larger bushes, e.g., Caesalpinia (18), Euphorbia tiruculli (40), Prosopis, (69-70). Synadenium granlii (77), Vitex negundo (85A).

For line C use small trees e.g., Albizzia amara (6), Cassia fistula (25), Delichandrons falcata (33), Tamarix (79), Zizyphys jujuba (89), Parkinsonia aculeata (61A).

For line D use taller trees e.g., Acacia arabica (1), Acacia catechu (2), Albizzia species (6-8), Bassia latifolia (14), Eugenia (37), Feronia (41), Hardwickia (49), Inga (50), Largerstroemia parviflora (53), Mangifera (55), Melia azadirachta (56), Phyllunthus emblica (63), Soymida (75), Tamarindus (73), Dendrocalamus strictus (4),

It is possible to reduce the width of the belt to meet less severe conditions; in every case the tree growth should offer a solid obstruction to the passage of the wind.

Inside the farm area protected by the main external belt it is desirable to raise lines of no shrubs with trees at intervals along survey number boundaries, bunds or along strips which are not ordinarily ploughed up for cultivation. Species recommended are:—

Adheioles (4), Jatropha (51), Syndenium (77), with trees like Acacia arabics or its varieties (1), and Hardwickia binata (49).

<sup>\*</sup> These species requires to be kept in check from invading cultivable areas. There is no danger to areas which are regularly ploughed and weeded.

# SCHEDULE B—List of Trees.

Á	Yields fruit, nuts and preservative soil,	Excellent fuel. Tough wood for handles.	Yields a fruit which is an excellent vegetable.	Evergreen. Yields a large fruit,	Fuel and wood for walking sticks.	Seed yields useful oil. The flowers are sweet and edible and can be sold to the Exoise Department.	Yields a useful dye.	Wood useful for planking, well lining, Carres and match manufacture. Cotton is good for pillows, etc.	Bark yields cordage. Gum a dye and a tanning material. Leaves used for food plates. Seeds authelmintic and purgative.
: Å	Seeds and seedlings	Difficult to grow from seed, but seed and seed. lings to be tried.	Seedlings	Seed of scedlings	Seed	Do. :	Ъо.	Do. ::	.:
Do.	Lateritic and sandy soil not thrive in extremely dry situation.	Almost anywhere	Rich soil and rainfall over 50 inches.	Medium soil and rainfall over 30 inches.	Dry tract	Dry tract—medium to good soil.	Almost anywhere in Gardens	Do	Anywhere
G. Kolis airi K. Kola Shiras. K. Godhonchi.	G.&M. Kaju M. Godambe.	G.&M. Dhavada K. Dindal.	Bread frunt tree	G.&M. Phanas K. Halsu.	G. Hingol K. Hinganbetta.	G. Mowra M. Mhowra. K. Ipoi.	Annoto	G. Simls M. Sasar. K. Bural.	G. Khakra M. Palas. K. Muttal.
:	:	:	:	:	:	:	:	:	:
8. Albizzia odoratistima	9. Anscardium occidentale	10. Anogeissus latifolia	ll. Artocarpus incisa	12. Artocarpus integrifolia	13. Balanites roxburghii	14. Bassis latifolia	15. Bixa orellana	16. Bombax malabaricum	17. Butes frondoss

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Botanical name.		Z Z Z Z	Local names. G—Gujarathi. M—Marathi. K—Kanarese.	Lossity for which suited.	Mode of Propagation.	Une.
18. Caesalpinia sepiaria		R.K.G.	Chilar. Hotsige.	Dry areas	Seed	Hedges, Bark is tan material.
19. Capparis aphylla		NK.	Kar Mera, Neptad. Shiprigida.	.:	. Do.	Hedges. Fruit packed. Wood for fuel and small implements.
20. Capparis divarical	:	r K K	Tarati. Revdi,	Very dry areas	Do.	Hedges.
21. Copporis grandis	:		Pachamada Panchameda Kuantal. Torate.	.: Э	Š.	Hedges. Wood is durable.
22. Capparis spinosa	*	Vern. Kabar	abar		. Do.	Hedges. Buds are pickled. Leaves and fruit are favourite fodder of goats and sheep.
23. Capparis zeylanica	:	M.	Waghati	Kookau	Do.	Hedges, Fruit is pickled.
24. Carissa carandas	:	G.&M. K.	Karwand	Anywhere		Fencing material and edible fruit.
25. Camia Setula	: :	유리를	Gernuli Beliara. Kakkal	Almost anywhere	i.	Ornamental. Yiskis fuel and tim- lor. Seed prigative.

Fast growing shade tree. Fuel.	Very good fuel. Suitable for avenues, wind breaks, and plantations on short rotation.	A very useful fruit	Leaves and young twigs good fodder. Wood is useful for fuel.	å.	Fuel, fencing and small timber for tool handles.	: : : :	Wood useful for general purposes.	Hedges, fuel.	Hedges, Firewood.	Timber, fuel, and leaves for oil.	Edible fruit, Shade tree. Wood use. ful for well curbs, etc.
:	` <b>:</b>	:	:	: ;	:		:	:	ings	aður	
Do.	Seedlinge	Do.	Seeds	.; Q	Do:	:	Ъ.	Š.	Seed and cuttings	Seed and outlings	á
:	on ub-	gardens	shallow y dry	shallow well in	•	:	;	,	t areas	ecies to	:
	Good soil on up-	bere in	in extremely shallow and extremely dry	tremely do very	r soil	r soil			as mois	erent sp.	tions
å	Sea shore. (ghat tracts.	Almost anywhere in gardens		Except in extremely shallow soils. Will do very well in irrigated tract.	Dry and stony soil	Dry and stony soil	Ď.	Dry tracts	Dry as well as moist areas	There are different species to suit almost any.	In moist situations
			Excep soils tracte	Exc iri	Dry	<u> </u>		Å.		The The	a a
:	:	:	:	:	; :#	: ' <b>a</b>	: •=i		:		:
Kashid	Suru	Timbu	Sissam Biti.	Shisma Sissoo.	Vilentra Sigma kati.	Tembra Tembhurni. Tumbri.	Medsing Godmurki	Latchumi Paorili. Bundurgi.	Duranta	: :	Jambhal Niral
M.	W.	M.	G.&M. K.	g. M.&K.	j.¥	KK.G	G.&M. M.	Ä ÄÖ	:	K.K.	G.&M. K.
:	•	:	•	*	:	:	:	•	:	:	; (
26. Castis sismes	37. Casuarina equisetifolià	28. Citrus medica	29. Dalbergia latifolia	30 Dalbergia sissou	31. Dichrostachys cinerea	32. Diospyros	33. Dolichandrone falcata	34. Dodonaca viscosa	35. Duranta Plumieri	36. Eucalyptus species	37. Bugenia jambolana
ĸ	55	90 80	<b>%</b>	8	31.	33	33	ž	35.	ģ	37.

# SCHEDULE: B-conf.

		:				
Botanical name.	The second secon	Local names. G—Gujarathi. M—Marathi. K—Kanarese.	sthi. thi. rese.	Locality for which suited.	Mode of Propegation.	Use.
38. Euphorbia neriifolia	:			Waste lands, etc.	Cuttings	Hedges. Occasionally for fuel.
		M. Nivdung. K. Yelikalli.	ung. alli,			
39. Euphorbia nivulia	:	G		Do	 Do.	ϰ
40. Euphorbia tirukalli		G M. Nevli. K. Kalli.		Do. :	Do.	Hedges. Wood for gunpowder char- coal and fuel. Twigs hung up prevent mango flies in houses.
41. Feronia elephantum	•	M. Kevat K. Belwal. G. Cawtha,	al.	Dry areas	Seeds	Fruit edible, gum, fodder, fwel.
42. Fious bengalensis	:	M. Wad G. Wad. K. Alad.	:	Almost anywhere	Stout branch cuttings	Shade.
43. Ficus glomerata	•	G. Umeda M. Umbar. K. Atti.	da	Moist situations, road sides, etc.	Seedlings and cut- tings.	Fruit edible. Shade tree.
44. Ficus religiosa	*	G. Pipal M. Pimpal. K. Arali.		Almost anywhere	.: :	Shade.
45. Flueggia microcarpa	:	G M. Pandhar K. Bilihorli.	Pandharfali. Bilihorli.	Waste lands, etc.	Cuttings and seed	Hedges. Fruit edible. Wood for fuel and Agricultural implements.

Yields Kokam butter. Fruit used in ourries.	Strong light timber.	Fencing and fuel material.	Leaves are an excellent fodder.	Fruit edible. Wood for fuel, etc.	Hedges. Seeds yield an oil.	Ornamental hedge plant.	Fair fuel.	Yields a dye. Good for hedges and screen.	Edible fruit. Wood for fuel and construction shade.	Wood for construction, leaves and fruit oil in medicine Bark for,
Seed	 	. :		Do. :	Seed and cuttings	Do	Seed	Seed and cuttings	Seedlings	Seed.
Areas of rainfall down to 30 inches.	Almost anywhere	Dry rocky places	Dry tracts	Dry areas	Do	Almost anywhere under garden conditions.	Almost anywhere	Almost anywhere under garden conditions.	Almost anywhere if given care in the early stages.	Anywhere
G.&M. Batamba K. Murgal.	G. Shewan M. Shiwan. K. Shiwani.	M. Henkal	M. Anjan K. Karchi,	G. Vilayti Amli M. Vilayti chinch. K. Vilayti Hunshe.	G M. Mogh erand. K	. Chinamendi	G. Bondar M. Bondars. K. Channagi.	Mendi	G.&M. Amba K. Mavin.	G. Nimb M. Neem. K. Kahi bevu.
46. Garcinia indica	•	46. dymnosporia emarginata	49. Hardwickia binata	50. Inga dulcie	51. Jatropha curcas	52. Legeratroemia indica	53. Legerstroemia parviflora	54. Lawsonia alba	55. Mangifera indica	56. Kelia azadirachta

SCHEDULE B-cond.

Botanical name.	Local names, G—Gujarathi, M—Marathi, K—Kanarese.		Locality for which suited.	Mode of Propagation.	Use.
57. Millingstonia hortensis	G M. Aksh-Nimb. K. Sugandhi.	ab.	Anywhere on good soil	Seedlings	A roadside and ornamental tree.
68. Mimeops elingi	G. Rayan M.&K. Bakul.	•	In region of good rainfall or in deep soil.	Seed	Seed yields an oil. Flowers are sweet ecented. Wood is hard, heavy and durable. Shade.
59. Mimeops hexandra	G. Ranjana. K		Dry tracta		Frit edible. Wood hard, heavy and durable.
60. Mofings pterigosperms	G. Sergwa M. Shewga. K. Nuggi.	:	Anywhere		Fruit and root used as vegetable. Useful for the kitchen yard.
61. Mofus indica	Tut M. Ambat.	:	Anywhere in gardens	. Do.	Fruit edible. Wood for fuel, leaves for fodder and sericulture, twigs for basket weaving.
61A. Parkinsonia aculeata	G M K. (Vileyati Kikar).	:	Grows in all dry areas and on black cotton soil,	<u>څ</u>	Used for hedges.
62. Phoenin species	M. Shendi K. Leksl. G. Khirdi.	:	Black cotton soil, water logic area. Sandy soil.	å	Fruit, toddy, gur, mat and beshet making.

#4 <b>2</b>	66. Phyllanthus emblica	-	o zi zi	Awsle Awsli Nelli.	Dry treat	 Q	Wood for fuel. Fruit for picking. Contains a very high percentage of Vitamin C.	
<b>2</b> .	64. Pithecolobium saman	:	, :	Rain tree	Anywhere	Do. :	Fuel and shade. Fast growing.	
<b>8</b> . T	66. Plumeria scutifolia	:	<b>છે.≱</b>	Bhad champo Chameli.	Do.	Cuttings	Ornamental.	
96. P	66. Poinciana regia	:	:	Gulmohor	Anywhere if care is given in early stage.	n Seed and cuttings	Ъ.	
87. P	<ol> <li>Polyalthia longifolia</li> </ol>	•	:	Asoka	Do.	Seedlings	Ornamental, Febrifuge, Shade,	
68. P	68. Pongamia glabra		K.K.G.	Karanj Do. Huegal.	Ď.	Seed and seedlings	Shade. Seeds yield an oil,	
8	69 Prosopis juliflors	:	ĸ.	: :	Arid areas	Seed	Pods are excellent fodder. Gum and fodder.	
5 F	70 Prosopis specigera	:	Z.S	Sumri Saundad.	Dry tract	Do.	Young pods a vegetable. Pods and leaves fodder. Wood is a fair fuel.	
71. P	71. Pterocarpus marsupium		M. K.C.	Beo Bibls. Honni.	Anywhere with a rainfall of 25 inches or more.	ال :- :-	Yields gum Kino. Leaves for fodder and wood is an excellent timber.	
# %	72. Rhus mysorensis	•	Z, Z, Z,	Amoni	Dry areas	Seed and outtings	Hedges. Bark is tan material.	
<i>∞</i>	73. Santalum albaum	:	<b>لان</b> ان	Suket Chandan. Gandha.	Anywhere in hedges slong with other trees.	Zieed.	A valuable wood.	
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Botanioal name.  74. Sesbania aegyptiaca  75. Soymida febrifuga  76. Swietenia mahagony  77. Synadenium grantii  78. Tamarindus indica  79. Tamarix species  80. Tectona grandis	: : : : :	W.Y. W.Y.	Local names.  G—Cujarathi.  M—Marathi.  K—Kanaresc.  I. Shevri.  C. Suami.  Mahagoni  Mahagoni  Ilayati shend  Amli Chinch.  C. Amli  K. Amli  K. Amli  K. Amli  K. Amli  K. Sag	Locality for which suited.  Cultivated lands  Dry tract  Anywhere under proper care and on good soil.  Dry areas, etc  Almost anywhere  River banks and sandy areas In good soil down to 80 inches	Mode of Propagation. Seed Do. Cuttings Seed Do. Do. Do. Do.	Quick growing short lived shrub for hedges.  Bark for medicine and tanning, Wood is a good heavy timber.  Excellent timber for furniture.  Hedges. Very easy to grow.  Fruit an article used in cookery. Seed for sizing.
81. Terminalia catappa	•	M. Sagwan K. Tegu Sa Bengali Badam	· gwan	rain. For cultivation in gardens and yards in places of good rain.	: :	nucomparane amoer for all general purposes. Durable.  Yields a spurious " Badam".
82. Terminalia chebula		r K K	Hirda.	fall. In poor soil in heavy rainfall areas.	: å	Fruit a very good tan material.

Good fuel and medium quality tim-	Good fuel and good heavy timber when it grows to large size (in localities of favourable rainfall).	Bark yields cordage, also a red dye. Wood is very tough and elastic. Used fortonga shafts, etc.	Useful for afforestation work, producing root suckers and growing readily from cuttings. Twigs used for wattle work and rough basket work. Best hedge plant along roads and between fields. Leaves credited with insecticidal properties.	A hardy tree for wastelands. Fuel and edible fruit.	Hedges. Flowers yield a dye. Leaves are tan material. Wood for fuel.	Leaves for bidies and dyeing. Wood for carving and fuel.	Edible fruit. Wood for agricultural implements, oil mills, etc. Leaves for fodder. Barks contain tanning.
:	:	:	steam.	:	:	:	:
ឝំ	р <b>о</b> .	Seed and cuttings	Seed and s cuttings.	Seed	Seed and enttings	Seed	Dø,
ches.	;	:	as to raste. ks of	:	•	•	:
In medium soil in areas of rainfall down to 40 inches.	Almost anywhere	Cosetal region	From heavy rainfall areas to dry areas. In open wastelands. Along the banks of the rivers and nallas.	Anywhere	Dry areas, etc.	In the dry tract	Anywhere
:	:		:	:	:	:	:
Kindal. Balimatti.	Sadada Ain. Matti.	Paranch pimpla. Bhendi. Huvarasi.	Nirgud. Lukki. Nukki.	Alu.	Dharadina Dhayti.	Dudhi Kuda. Kodmurki.	. Bor Bari:
NK G	KK G	KK G	ŖŖĠ	نة تع	S X X	r K K	G.&M. K.
:	:	:	•	:	;	:	:
M. Terninalia paniculata	84. Terminalia tomentosa	35. The spesis populaes	85A. Vitez neguhdo	S6. Vangueija spinosa	87. Woodfordia floribunda	88. Wrightia tinctoria	89. Zisyphus jajuba

SCHEDULE B-concid

	•	Mode of Propagation.	Uje.
M. Ghatbor. K. Godechi.	Dry ateos, etc.	Seed :	Hedges. Fruit used for dyeing leather. Wood for tweches, carta, fuel.
Ватьос.			
91. Bambusa arundinacea G., Padhalor places of kashtel. ra'nfall. K. Douga.	situations or in of medium to heavy	Seed (rarely available) or root stocks,	The large bamboo. Useful for many purposes.
92. Bambusa nana M. Barik bamboo Under i and good	Under irrigated conditions and good rainfall areas.	Seed and root stocks.	Makes a good hedge.
93. Bambusa vulgaris M D. K D. G	Dô	Seed and root by layering.	Seed and root by A useful bamboo with clean culmalayering.
94. Dendrocalamus strictus M. Manvel Dry tracts G	Dry tracts	Seed (occasionally available or root stocks).	The "solid" bamboo. Useful for many purposes.
95. Oxytenanthera stocknii K. Konda . On the co	On the coast	Seed or root stocks	Seed or root stocks A very useful bamboo.

#### APPENDIX B

Compost Euglistation passed by State Governments (Please vide also Compost Bulletin Vol. 2, No. 3 and Vol. 3, No. 1)

#### **PUNJAB**

(Extract from the Punjab Government Gazette (Extraordinary) dated 15th April, 1950).

#### LEGISLATIVE DEPARTMENT

The 15th April, 1950.

No. 37-Leg./50.—The following Act of the State Legislature received the assent of His Excellency the Governor of Punjab on the 12th April, 1950 and is hereby published for general information.

## Punjab Act No. VIII of 1950

THE EAST PUNJAB CONSERVATION OF MANURE (AMENDMENT) ACT, : 1950.

AN ACT TO AMEND THE EAST PUNJAB CONSERVATION OF MANURE ACT (XV of 1949).

## It is hereby enacted as follows:

- 1. Short title extent and commencement.—(1) This Act may be called the East Punjab Conservation of Manure (Amendment) Act, 1950.
  - (2) It extends to the whole of the State of Punjab.
  - (3) It shall come into force at once.
- 2. Amendment of Sec. 2 of East Punjab Act (XV of 1949).—In clause (j) of section 2 of the East Punjab Conservation of Manure Act, 1949 (hereinafter referred to as the said Act) for the figure '6' occurring in line 2 the figure '5' shall be substituted.
- 3. Amendment of Sec. 9 of East Punjab Act (XV of 1949).--For Section 9 of the said Act, the following shall be substituted:--
  - 9. (1) If the Provincial Government is of the opinion that any area is required for conservation of manure, in pursuance of an application made to it by any Committee, it may by notification declare such area to be so required for the purpose of this Act and such notification shall be conclusive evidence of the matters stated therein, and shall be not liable to be called in question in any court.
  - (2) The Deputy Commissioner of the District in which the area referred to in sub-section (1) is situated shall give publicity to the notification issued under sub-section (1) in such manner as he may deem fit.
  - (3) After the expiry of 15 days from the issue of a notification under sub-section (1) the Deputy Commissioner may, not-withstanding any law to the contrary authorise the Committee to take possession of the area specified therein.

- (4) The Deputy Commissioner shall then proceed to occupy the area or procure its occupation, as the case may be, and the provisions of the Land Acquisition Act, 1894, except sections 4 to 8 inclusive as amended by the Land Acquisition East Punjab (Amendment) Act, 1948, shall be applicable as nearly as may be.
- 4. Amendment of Sec. 11 of the East Punjab Conservation of Manure Act (XV of 1949).—In section 11 of the said Act, for the words 'Officer of the Department of Agriculture not below the rank of Agricultural Assistant' the words 'Revenue Officer not below the rank of Naib Tehsildar' shall be substituted.
- 5. Amendment of Sec. 15 of the Conservation of Manure Act (XV of 1949).—In section 16 of the said Act, for the words 'Officer of the Department of Agriculture not below the rank of Agricultural Assistant' the words 'Revenue Officer not below the rank of Naib Tehsildar' shall be substituted.

# THE PATIALA AND EAST PUNJAB STATES UNION MUNICIPAL (AMENDMENT) ORDINANCE, 2006

# (Ordinance No. III of 2006).

#### AN

ORDINANCE TO AMEND THE MUNICIPAL ACT IN FORCE IN THE PATIALA AND EAST PUNJAB STATES UNION.

Whereas it is expedient to amend the Municipal Act in force in the Patiala and East Punjab States Union for the purpose hereinafter appearing;

Now, therefore, in exercise of the powers conferred by the Proviso to paragraph (2) of Article X of the Covenant entered into by the Rulers of the East Punjab States, as amended by Article I of the Supplementary Covenant, the Raj Pramukh is pleased to make and promulgate the following Ordinance:—

- 1. Short title and commencement.—(1) This Ordinance may be called the Patiala and East Punjab States Union Municipal (Amendment) Ordinance, 2006.
- (2) It shall come into force on the date of its publication in the official Gazette.
- 2. Definitions.—In this Ordinance, unless there is anything repugnant in the subject or context:—
  - (a) "Act" means the Punjab Municipal Act, 1911, as in force in the Patiala and East Punjab States Union;

- (b) "Financial" Commissioner includes any officer over-exercising the powers of the Financial Commissioner;
- (c) "Government" means the Government of the Patiala and East Punjab States Union.
- 3. Amendment of Section 3 of the Act.—After clause (18) of section 3 of the Act, the following new clauses shall be added, namely:—
  - "(19) "Dung" shall, for the purposes of sections 154-A and 164-B, include night soil, sewage, sullage, sludge, refuse, filth or rubbish or animal matter of any kind;
  - "(20) "Compost manure" means the produce prepared from dung by subjecting it to the processes of compost making in the manner prescribed by rules".
- 4. Amendment of Section 52 of the Act.—In clause (a) of sub-section (2) of section 52 of the Act after the word "watercourses" the following words shall be inserted, namely:—
  - "and the preparation of compost manure".
- 5. Insertion of new sections 140-A, 140-B, 140-C in the Act.—After section 154 of the Act the following new sections shall be inserted, namely:—
- "154-A. Preparation of the Compost manure.—Where the Government so requires it shall be the duty of a Committee to subject all dung the process of making compost manure.
- "154-B. Power to acquire dung.—Where the propety in any dung vests in any person or class of persons other than the committee, the committee, on a requisition under section 154-A, shall acquire from such person or class of persons either permanently or for such period as it may deem fit, his or their rights or interests in the dung on payment of reasonable compensation as the committee may assess in the manner prescribed.
- 154-C. Right of appeal and revision.—(1) Any person aggrieved by an order passed by a committee under section 154-B may, within thirty days from the date of the communication to him of the order, prefer an appeal in writing to the Deputy Commissioner of the district in which such committee is located.
- (2) The Deputy Commissioner shall not be disqualified from disposing of the appeal if he is himself a member of the Committee whose decision is appealed again.
- (3) The Deputy Commissioner shall send for the records of the cases from the committee and, after giving the parties an opportunity of being H130Mof Agriculture

heard and, if necessary, after making such further enquiry as he thinks fit, (either personally or through an officer subordinate to him) decide the sppeal.

- (4) Except where the order of a committee is confirmed by the Deputy Commissioner on appeal, a second appeal shall lie to the Financial Commissioner within thirty days of the date of order passed in first appeal.
- (5) The Government or the Financial Commissioner may, at any time, call for the records of any case pending before or disposed of by the Deputy Commissioner.

Provided that this power shall not be exercised by the Financial Commissioner if an appeal has been referred to him under sub-section (3) or if the Government takes action under this sub-section.

Provided further that the Government or the Financial Commissioner, as the case may be, shall not revise or modify an order affecting any person without giving such person an opportunity of being heard.

- "154-D. Jurisdiction of civil courts barred.—Notwithstanding anything in any other law for the time being in force, no civil time court shall have Jurisdiction to entertain or adjudicate on any suit, application or other proceedings relating to the right or interest to or in the compensation referred to in section 154-B or the amount or apportionment or the payment thereof or any matter connected therewith".
- 5. Amendment of section 240 of the Act.—To sub-section (1) of section 240 of the Act the following new clauses shall be added, namely:—
  - "(ZZZZ) mode of assessment, apportionment of compensation under section 154-B amongst and payment to the persons entitled thereto;
  - (ZZZZZ) mode of communication of the order to a person under section 154-B;
  - (ZZZZZZ) the manner in which the compost is to be made ".

# MAHARAJADIRAJ MAHENDRA BAHADUR,

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#### APPENDIX C

SEWAGE AND SULLAGE UTILIZATION IN INDIA FOR CROP PRODUCTION

BY

# DR. R. P. TALATI, M.Ag., Ph. D., SEWAGE DEVELOPMENT OFFICER, GOVERNMENT OF INDIA.

In India some 25 cities and towns with a population of above 1 lakh have been provided with under ground drainage. The sewage is disposed off in perennially flowing nales or rivers or sea or through filtration beds or used by broad irrigation. It has been estimated that 500 million gallons of sewage are available per day out of which about 10% is at present utilized, while the rest is disposed of as stated above causing pollution of nalas and river waters with consequent dangers to the ryots, who use these waters for drinking purposes.

- 2. There are about 271 towns in India with population of about 50,000 which have surface drainage only. The sullage is discharged into the nalas except in a very few cases, where it is used for raising of fodder crops. The sullage flowing from these towns is at present estimated at over 200 million gallons per day. There are also 575 towns with population from 20,000 to 50,000 which yield about 100 million gallons of sullage per day.
- 3. Recent advances in the science of sewerage system adopted by the Public Health Engineers of various province and other relevant agencies, consist of proper designs of out-fall works and sewage channels so that the sewage is disposed off without causing nuisance to the public. But under present day conditions of food shortage in India and the need to make the country self-sufficient in the above matter as quickly as possible, it is necessary that the method of disposal of sewage should combine in addition to fulfilling requirements of public health also the national requirements of the utilisation of the above material so as to increase agricultural production. Such a method of disposal cumnifilisation would prove to be not only economically sound in the long run but also financially advantageous to the numicipal bodies concerned who can recover a good portion of their capital investment on the disposal works from the receipts of supply of sewage to agriculturists.

# II. SEWAGE UTILIZATION IN WESTERN COUNTRIES.

- 1. The tendency in recent years in other countries has been towards adopting similar systems of disposal cum-utilization of sewage as evidenced by recent developments in United Scates of America, Europe, Australia etc.
- 2. It has been accepted in foreign countries, specially in western parts of United States of America that sewage is an important source of supplemental irrigation.

- 3. Moscow utilised its sewage for irrigation. The Lubline farms extending to about 8 miles from the city commanded an area of 3,135 acres for a discharge of some 18 million gallons. Some portion out of this was put under various crops like cabbages, rye grass, willows etc. 2.484 acres were fed by gravity while sewage was pumped to remaining sections by simple screening and brief sedimentation. The rest of the sewage received no preliminary treatment. The irrigation fields were divided into suitable units, had 80,000 feet of brick and concrete distributing channel, 6 lakhs feet of roadways, besides several feet of drains\*.
  - 4. In Paris the total irrigated area amounted to 13,597 acres. On this farm alone, there were some 34 miles of distributing channels, besides fields channels. The crops grown were peas, artichokes, tomatoes, onions, potatoes, asparagus, sugarbeets and cereals. The cultivation of crops eaten raw was prohibited. It would be interesting to note that the sewage farming was found so very successful that the city had serious difficulty in securing extension of its farms on account of the opposition of farmers, who objected to unfair advantage given to the favoured few, who would receive sewage for irrigation\*.
- 5. The sowage farms of Berlin were in operation about the year 1880, and the area irrigated by about 1938 increased to 56,800 acres. In addition to 20" of rainfall 79 acre inches of sewage irrigation containing 1400 lbs. of nitrogen, 350 lbs. of phosphoric acid and 100 lbs. of potassium were added per acre per annum, though according to Agricultural authorities the correct dosing was about 1/3rd of this quantity. It may be noted that the main object of sewage disposal in Germany was to aid in its agricultural independence.\*

#### III. SEWAGE UTILIZATION IN INDIA.

- 1. In India the utilization of sewage is particularly important as we are in need of water and manure. It has also become possible in a number of cases to combine sewage and canal irrigation schemes in certain localities to secure best results from point of view of economic use of nitrogen for crop production.
- 2. Irrigation and other data of typical sewage farms and estates given in the accompaniments show vide variation in the quantities of irrigation applied per acre. This is mainly due to the varying nature of soils and subsoils and the crops raised thereon. Observations have, however, shown that no deleterious effects have been noticed on the crops or on the soils so long as the quantities of sewage applied are limited to the water requirements of the crops. The success of sewage farming over a long range, therefore, lies in raising crops with minimum depths of irrigation. Taking into consideration beinnial rotation of crops, one

† Report of Mr. N. V. Modak on Sewage disposal published by the Bombay Muni-

cipal Corporation, 1938, page 92.

<sup>\*</sup> Sewage Disposal by: Leonard, P. Kinnicutt, C. E. A. Winslow and R. Winthrop Pratt, 2nd Edition, Chapter VIII on Disposal of Sewage by Broad Irrigation or Sewage Farming, pages 222 to 226.

million gallon of sewage effluent per day which would represent a population equivalent of 50,000 souls, would ordinarily irrigate an area of 200 acres with light to medium soil and 400 a res with medium to heavy soils. This discharge of one million gallons under intensive cultivation can comfortably engage 40 to 50 peasant families each with economic holdings. They will produce varieties of crops as detailed at the end, which would be made available to the people of the town.

- 3. As stated earlier in the note 700 million gallons of sewage and sullage water at present are available for utilization. Out of this about 50 million gallons are used for purposes of irrigation and the remaining 650 million gallons are wasted. In several areas other sources of water-like canal, tubewells or ordinary wells, are available for diluting the sewage or sullage. On the whole, it can be estimated that about 1,300 million gallons of diluted sewage is available for utilization.
- 4. This discharge of 1,300 million gallons of sewage per day can irrigate an area of 3,90,000 acres or about double the area will be enriched by this manure on biennial rotation. It will be also possible to utilise the sludge which will be available to the extent of 5,00,000 tons for manurial purposes. The manurial ingredients from the utilisation of all sewage would be as under:—

1, Nitrogen .												Tons 45,360
	•	•		•	•	•	•	•	•	•	•	20,000
2. Potash as K.	0											23,134
8. Phosphoric aci	d as I	, O,	•		•		•			•	•	29,484

The extra produce of food grains from this source would be to the extent of 6 lakhs tons. The money value of this produce would be equivalent to about 20 crores of rupees.

## IV. PRECAUTIONS IN SEWAGE UTILIZATION.

- 1. Sewage irrigation used for intensive cropping when applied to light, medium and heavy soils from 2 feet to 8 feet depth over lying permeable stratum gave drainage effluents which had higher degree of purification than most of the biofiltration purification plants. Uniform results were obtained for five years successfully.
- 2. Bacterially there was little difference between percolation waters from the sewage irrigation zone and canal irrigation zone.
- 3. Percolation waters from the sewage zone were very beneficial for irrigation purposes.

#### V. HYGIENIC ASPECTS.

All food crops that are cooked or processed before consumption can safely grown under sewage irrigation e.g. cereals like wheat, rice, jowar, potatocs, other vegetables which are cooked, fruits like papavas or bananas and sugarcane grown for preparation of gur or sugar\*.

<sup>\*</sup> Investigations on Sewage farming—Progress reports from 1942 to 1948 by S. C. Pillai, R. Rajagopalan and V. Subrahmanyan—Scheme of research under the auspices of the Indian Council of Agricultural Research.

## VI. POINTS TO BE NOTED IN LAY OUT OF A SEWAGE FARM.

Irrigation with sewage has to be considered with two main objects, viz., efficient disposal of sewage and the cultivation of crops from which a profit may be derived. The art of sewage irrigation lies in the profitable utilization of sewage without in the least subordinating the scientific and hygienic requirements of efficient disposal. A successful sewage farm is the result of composite efforts in these two directions. We have, therefore, to consider the suitability of soils in respect of their adaptability to both these objections. The difference in adaptability of different soils to this process is more a matter of degree. But this factor so materially influences the economies of the process that for practical purposes some soils have been regarded as eminently suitable for sewage irrigation while others are considered unsuitable. Some soils infiltrate very little sewage even when underdrained and even if the intensities of application of sewage is limited to agricultural and hygienic requirements, the extent of land required becomes so large so as to render the process economically unacceptable. With these basic considerations, the following additional points require examination:-

- 1. Quantity and quality of sewage.—It will be necessary first to examine the discharge of available sewage and its quality. The sewage may be weak, medium or strong. It is known that weak sewage can to used without dilution, while a strong sewage will have to be suitably purified or diluted to make it useful for agricultural use.
- 2. Selection of a suitable site for sewage irrigation.—For this purpose, a preliminary soil survey will be required. It will be necessary to examine the ground contours with reference to place or places of outfall works, the water tables from existing wells or bere-wells, relief, i.e. sub-soil drainage conditions etc. The selected site should not ordinarily be on the windward side of the town. Light to medium textured soils with good natural drainage would be a suitable for sewage irrigation.
- 3. After selection of site it may be demarcated into proper blocks for irrigation purposes. Adequate provision should then be made for distributing channels and out-let channels with grades sufficient to maintain a proper oxygen balance during the transit of the manurial water.
- 4. It will be necessary also to give a controlled supply of this irrigation and for this purpose necessary provision for standing wave flumes or Gibbs Modules should be made.

Thus, a soil survey plan showing thereon the above data will form the first part of a sewage or sullage utilization scheme.

#### VII. CROPPING PROGRAMME.

- 1. After attending to the survey work mentioned above, the whole area should be demarcated into various blocks according to soil conditions. Different cropping schemes may be prepared according to soil conditions. Provision of proper rotations and of simultaneous green manure crops are pre-requisites to a successful sewage farm, as this will maintain tilth of the soil under intensive cultivation.
- 2. It is necessary to give timely cultural operations to crops. This process is found to maintain a proper nitrogen-phosphate balance, and induces timely maturity of crops.
- 3. It is necessary to follow the ridge and furrow method of irrigation or the Broad Ridge system of irrigation in preference to bed method of irrigation. The latter has been found to be a wasteful method of irrigation, which adversely affects the soil tilth and the crop growth.
- 4. It is necessary to follow dry farming methods. Two inch depths of this irrigation water coupled with cultural operations would induce timely maturity of crops and give better quality of grains and of other produce.

Sewage irrigation promotes considerable weed growth. The remedy consists in giving more space to food crops or fodder crops to allow the bullock operations to be done in standing crops. Special weeding hooks, which will take out the weeds as far as possible rather than remove them superficially will reduce the intensity of weeds.

It has also been experienced that careless sewage irrigation either results in insipidity of fruits, ill formed grains, rapid decay of product or malformations due to diseases and pest troubles. This will show the importance of careful sewage irrigation.

- 5. It will be necessary to make adequate provision for drinking water supply for the resident population in the sewage zone, as the sub-soil waters or well waters in this zone will be in danger of contamination.
- 6. Residential arrangements for permanent workers will have also to be made. Their health and hygienic conditions will have to be looked after by the Superintendent of the farm.
- 7. Plot scale experiments carried out by the writer with the Poons sewage at Hadapsar Research Station, where all the above items were carefully followed, gave results of practical importance. A few sets of results with varieties of crops are given in the accompaniments, which show a great future for raising of different types of garden crops, food crops, fruit crops, vegetables, cash crops like sugarcane and perennial edder crops for dairies.

# VIII. UTILISATION OF SULLAGE.

- 1. As stated above appreciable quantities of sullage of smaller towns are at present going to waste. This can be utilised in two ways:—
  - (i) Smaller quantities for compost production.
- (ii) Quantities about 3 lakhs gallons and above for irrigation purposes.

Analysis of sullage water from a town showed it to contain 3 to 4 parts of total Nitrogen with low Oxygen absorption figures. This shows its importance as an inoffensive manure.

- 2. In many towns of the States the night soil and rubbish are mixed and then removed to the outskirts of the towns. Deficiency of moisture is noticed in this mixed stuff specially during the winter and hot weather seasons. Due to this reason some of the urban municipalities keep the refuse in heaps till the next monsoon or sometimes prepare 'B' grade compost of inferior quality containing as low as 0.4% nitrogen. Diverting the sullage water to compost trenching ground for supplying the deficiency of the moisture in the mixed refuse will enable the municipalities to prepare good compost throughout the year. This method of complete utilisation of small quantities of sullage of various towns will not only accelerate the progress of compost production, but will also greatly improve its quality. The cultivators on seeing the response of crops by application of this compost will put in their demand regularly and will be even prepared to pay more, than for the ordinary quality. The Municipal bodies will gain in disposing off the compost regularly and this arrangement of disposing off the rubbish in the trenching ground regularly will improve the sanitation of towns. The village improvement committee in collaboration with the Public Health, Agriculture, Co-operative and Revenue Officers of the Punjab (India) have done very useful work in this direction. They have paved all streets in about 300 villages and have also provided for surface drainage which accumulate at one outfall. lage is proposed to be used for agricultural purpose. The revenue from this source is expected to meet a greater part of the expenditure of maintenance of the drains and street payments.
- 3. It is proposed to extend this system with advantage to villages of other States.
- 4. This arrangement will lead to systematic use of sullage and contribute to improvement of village sanitation. This system will appreciably increase the quantity of rural compost.

5. Sullage of a small town yielding 3 lakh gallons per day will be equivalent to a yield of water from a good tubewell. Besides an acre of food crop will receive about 50 lbs of nitrogen from its application. This quantity will manure about 200 acres of food crops and if a tubewell is sunk and the diluted sullage is applied, a greater area can be benefitted from this method of irrigation.

Sullage farms of Amritsar and Jullundur in the Punjab (1) are excellent examples of sullage-cum-well water irrigation. Excellent crops of vegetables and subsidiary food crops like potatoes giving, average outturn of 200 maunds per acre, are raised year after year for the last two decades.

In conclusion, there is a great future for diverting all the sewage effluents for agricultural use. This is revealed from the surveys of the existing farms in the various state Governments where food, fruit and fodder crops are tried under different soil and climatic conditions. Efforts are now being made to put the existing farms on sound and sceintific lines, while suitable sewage or sullage utilization schemes are being drawn up where this manurial water is wasted. Different State Governments are spending appreciable amounts for preparation of public health schemes and if the local self Government and the Agricultural Departments of each Stage Government make adequate financial provision for utilising this manurial water for agricultural use along with other food production schemes, I believe they may be said to have contributed successfully towards food self-sufficiency programme of the Nation.

Statement giving Irrigation and other data of typical sewage Farms in India

Place	Discharge in day cusecs (cu. ft per second)	Area irrigated in acres	Calculated sewage used per acre per day (Gallons)	Nature of crops grown	Nature of soils in general
1	2	3	4	5	6
		<del></del>			
1. Poona Sewage Zone.	26 · 65	1,084	14,790	Till the year 1942	(Soils from Trap-
E20100		,		50% Heavy perennial 50% Seasonal and two seasonal.	Light to mediate um blacka soils.
2. Poons Sewage Zone.	<b>26-6</b> 5	3,000	4,630	80% seasonal crops (mainly food crops). 20% vegetables.	Light to medi- um black soil.
8. Ahmedabad Se- wage Farm.	29.0	1,500	10,600	60 to 83% perennial fod- ders 20% food and vegetables.	Sandy to sandy loams. (Allu- vial soils.)
		1			1

1	2	3	4	5	6
4. Dohad Sewago Farm.	0.75	118	3,390	45% Food crops mainly wheat 20% seasonal fod- ders. 10% vegetables 25% Cash crops (Sugarcane.)	Sandy oam to leams.
5. Baroda Sewage Zone.	6 44	400	8,750	100% Paddy (Kharif) 33% Wheat (Rab) 60% Vogetables (Rabi and early hot weather.) 33% Hot weather seasonal fod- ders.	Silty loams (Alluvial soils to Goradu to Gorat.)
6. Mysore Sewage Farm.	3.0		20,000	33% Fruit crops 15% grazing fodders 30% Perennial gras- scs. 10% Vegetables 12% Miscellaneous eropping.	Laterite soils Sandy leam loams.
7. Delhi Effluent Zone.	16.56	2,500	3,600	45% Foodcrops 25% Vegetables 5% Cash Crops (Sugarcane). 25%Grasses	Sandy loam to loams (Allu- vial soils).
S. Lucknow Sewage Farm.	8.28	340	13,240	80 to 90% Potatoes 10 to 20% Food crop 80% Hot weatther.	Sandy loams to loams (Aliu- vial soils).
9. Allahabad Sewage Farm and Nami Sewage Farm.	3.68	300 } 80 }	5,260	80% Potatoes , 20% Food ctops 80% Hot weather maize,	Sandy loams to loams (Al- luvial soils).
10. Patna Sewage Farm.	1.08	42	14,290	90% Perennial grasses. 10% Food crops	Loams to silty loams (Alluvial soils).
11. Nagpur Sewage Farm.	0.75	70	5,710	40% Vegetables 5% Sugarcane 55% Fodder crops	Black cotton soil (Trsp origin).

The 'N' contents of one cusec of sewage effluent per day can be calculated as under :-

$$\frac{24 \times 60 \times 60 \times 62 \cdot 5 \times N}{100,000} = 54 \text{ N lbs.}$$

The Nitrogen value of effluent is expressed as 54 R N, where R is discharge in day cusecs.

The supply of Nitrogen can be calculated according to the quantity of efficient irrigating a Specific area in each town.

Comparative Yields of important Crops under Sewage Irrigation Yields obtained at Poona (Bombay).

			. (	
Serial No.	Crop	Outturn under sewage irrigation lbs. per acre	Average outturn in Mutha valley (Canal Zone) lbs per acre vide Bulletin No. 154 of 1930 of Bombay Deptt. of Agricul- ture	General average according to "Amchi Sheti" ibs per sore
	F	OOD-CROPS		
1	Paddy (podki variety) .	2,620		•••
2		1,220		1,000
3 4		1.068	Do.	400
-	SUBSIDIA	ARY FOOD	ROPS.	100
1	Potatoes*	16,000	i	12,000 to 13,000 (Under loamy soils in Uttur Pradesh).
2	Sweet potatoes	15,025		(Average of the locality.)
	VE	GETABLES.		
1	Knolkohl	14,796		8,000
2	Cabbage	10,800	2,356	
3	Cauliflower	8,120		
4	Bhendi	6,342	2,396	4,000
5	French beans	7,200	4,967	6,000
. 6	Beet root	12,660	••	Not given.
7	Snake Courds (Padwal) .	16,112	••	••
8	Vegetable marrows	14,453	••	•
9	Chillies (green)	12,752	8,000	•
10	Gawar (Cluster Beans)	7,594 <sup>†</sup> DEN CROPS.	6,000	••
1	Ginger	8,752	5,394	6,000
2	Turmeric	22,225		16,000
8	Suran, 2nd Year Crop	12,840	Not given	9,680
4	Tobacco (Keliu variety)	931	964	••

<sup>\*</sup>Note:—Potatoes did not thrive well in medium black soils of the Deccan under sewage irrigation, but gave excellent response under sandy loam soil conditions. This crop wapredominant in Uttar Prades. and Punjab Sewage Farms.

### OUTTURN OF PAPAYAS UNDER SEWAGE IRRIGATION.

	Madhu- bindu	Washington	Data from Bulletin No. 162 of 1939 Deptt. of Agri. Bombay
Total yield during the two fruiting	51,238 lbs.	64,753 lbs.	34,193
Maximum No. of fruits per tree .	206 Nos.	147 Nos.	104
Maximum weight of fruits per tree .	429 lbs.	223 lbs.	203
Average No. of fruit per tree	61 Nos.	. 47 Nos.	27
Average weight per fruit	1,962 lbs.	1,959 lbs.	2.2

Much higher yields were obtained under sewage irrigation than under canal. Broad ridge method must, however, be followed under effluent conditions.

#### OUTTURN OF PERENNIAL FODDERS UNDER SEWAGE IRRIGATION

Grasses	1940-42	1943-44	1944-45	1945-46	1946-47	1947-48	Normal outturn per year vids Bulletin 100 of 1930 of Bom. Agri. Depts.
Rhodes	71,285 (236)	95,016 (662)	102,424 (655)	168,320 (203)	102,125 (842)	72,200 (6 <b>3</b> 6)	Not give
Elephant Graes .	(218)	112,470 (620)	104,788 (600)	142,230 (830)	102,300 (611)	118,640 (629)	71,780
Guinea . Grees	(904)	104,563 (567)	70,900 (633)	119,120 (773)	33,300 (622)	114,750 644	35,000

Bracketted figures show the total amount of 'N' applied per sore.

The green fodders were very useful to the draught and dairy cattle, who are them with relich.

# HEAVY DOSE EXPERIMENT (FIELD EXPERIMENT).

Planting .	Soil Types : Month of January						
Harvesting	1st week of February of the following year  1. Light soil (L.S.). 2. Medium Black Soil M.B.S.).	il					
	(1) Treatments 3 Nos.						
	(2) Varieties 2 Nos.						
	(3) Replicates 4 Nos.						
	(4) Subplots 48 Nos.						

(ac	Treatment (actual lbs. of N 'given)		No. of canes per acre	Cane weight in tons per acre	Gul weight in pallas per acre	Brix	Percentage of gul to cane	Purity %
			(SUC	AR CANE	VARIETY	CO 410).		
<b>300</b>	I.S.		32,450	54.50	51 · 54	20.11	10.1	80 · 15
	M. B. S.		31,950	47.28	47.41	20.64	10.7	80 · 27
600	L.S.		33,450	55-06	53 · 16	19.60	10.3	80.59
	M. B. S.		31,050	48.90	50.75	21.68	11.0	81.06
700	L. S.		29,350	54 · 47	52.70	19.74	10.3	78 · 84
	M. B. S.		31,900	49.06	48.04	29.06	10.5	81 - 97

<sup>1</sup> Palla = 3 Bengal Maunds - 240 lbs.

APPENDIX D
COST OF PRODUCTION OF TOWN COMPOST.

61. No.	Name of Municipality	Population 1941 census	Annual produc- tion of compost	ex ti to	pita pend re j on o mpo	di- por f	pe	abor arg r to of mp	es on	na per	epot nce r to of mp	te- on
	BOMBAY STATE		Tons	Rs	. a.	p.	R	3. a.	p.	Rs	. a.	p.
1	Junnar	. 9,951	144	1	9	0	0	13	4	0	5	7
2	Deolali	. 16,292	5,760	0	12	ì	0	11	0	1	0	81
8	Erandol	. 15,098	696	1	8	8	1	4	9	0	0	9
4	Chalisgaon .	. 22,122	1,262	3	2	81	2	7	6	0	3	2
5	Ranebennur .	. 16,994	243	5	14	2	3	7	3	0	4	31
6	Belgaum Cantt.	. 14,431	2,880	N	il		1	4	11	0	10	41
7	Barse	. 34,834	5,792	N	il		0	3	11	0	0	4
8	Miraj	. 32,455	2,920	0	6	62	0	2	41	0	2	82
9	Baroda	. 1,28,520	1,712	2	9	3}	2	12	ž	0	1	1;
10	Sirsi	. 10,451	380	N	il .		0	11	9	1	1	21
11	Jalgaon .	48,596	1,695	N	il		1	14	7	0	0	11#
12	Nadiad .	. 46,510	1,267	N.	il		3	7	ł	0	5	1
13	Dharwar .	. 47,992	1,099	4	4	5	3	5	11	0	1	51
14	Nasik	. 52,386	6,000	1	5	1	1	8	111	0	8	0
15	Gadag	. 56,283	1,977	2	2	5	2	Б	41/2	0	4	10
16	Baramath .	. 13,059	1,752	6	9	81	2	1	$5\frac{1}{2}$	0	2	ł
17	Hubli	. 95,577	991	0	7	4	2	15	9}	0	1	7
18	Surat	. 1,71,400	3,634	Ni	il		4	7	10	0	0	71
19	Broach	. 55,800	1,500	Ni	il		1	9	7	0	2	8
20	Poona Cantt.	40,400	46,656	Ni	iì		0	2	61	0	0	4
21	Belgaum .	58,300	1,093	Ni	1		0	6	6	0	3	51
22	Nandurbar .	22,100	980	Ni	1		0	8	8	0	0	5
23	Ahmednagar Cantt.	16,200	5,464	Ni	1		3	3	51	0	0	61
24	Dhulia	53,300	2,237	Ni	1		0	12	101	0	1	4
25	Pandharpur .	33,300	4,800	0	13	1	0	11	4	0	3	2
26	Bhusaval .	36,300	1,821	1	8	6	3	3	1	0	8	10

1	2	3	4	5	6	7
<b>27</b>	Poona City .	. 2,37,500	18,000	1 8 43	1 5 4	0 1 111
28	Ahmednagar City UTTAR PRADES	. 51,200 H	5,692	Nil	1 2 01	1 4 33
29	Allahabad .	. 2,46,226	2,100	0 10 8	2 3 1	0 1 4
80	Agra	. 2,57,368	16,800	1 3 ½	1 6 10	0 1 1
81	Lucknow .	. 3,54,560	1,920	0 8 4	2 3 7	0 2 1
82	Lakhimpur .	. 21,235	1,080	1 1 9	2 5 4	0 0 103
83	Hardoi	. 24,252	1,080	0 7 5	1 5 4	0 0 10
84	Bellia COORG	. 23,520	1,200	1 0 9	2 0 91	0 0 113
85	Mercara. P.E.P.S.U.	. 10,052	100	Nil	5 3 2	1 12 0
86	Jind MADRAS STAT	. 14,909	1,460	1 2 71	0 11 10	Nil
87	Tanjo .	. 68,702	6,182	1 4 114	0 5 11	0 0 14
38	Salem	. 1,29,702	13,127	0 7 9	0 12 101	· •
89	Mathurai .	. 2,39,144	12,000	3 2 81	1 1 2	0 3 4
40	Srivilliputtur .	34,642	730	Nil	1 13 5	0 9 9
41	Pollachi	. 25,198	4,168	5 8 10	0 12 3	0 2 4
42	Vijayawada .	. 86,184	1,260	Nil	2 1 8	0 2 6
43	Hospet	. 26,023	2,146	Nil	0 12 51	0 2 3
44	Bellary	. 56,148	1,460	Nil	0 11 31	1 2 0
45	Tirnbennaralai	. 33,575	1,000	Nıl	1 7 7	0 4 0
46	Chingleput .	. 17,829	3,532	0 10 6	0 7 3	Nil
47	BIHAR Sama tipur .	. 13,293	1,470	Nil		
48	Chakardharpur	14,807	1,200	0 13 4	1 11 7	0 0 7
49	Purulia	. 30,445	440	Nil	1 1 2	0 7 2
50	Deoghar .	. 19,792	720	Nil	0 15 3 2 12 9	0 1 9 0 3 4
<i>5</i> 1	Madhupur .	. 11,577	520	Nil	2 0 6	0 4 7
52	Chaibassa	13,052	312	0 13 4	2 11 1	0 0 9
53	Ranchi	54,178	4,752	Nil	1 11 10	0 0 9

1	2		3	4	5		6			7	-
54	PUNJAB (I) Batala		55,000	2,000	0 10	5	1 8	0	0	0	9
55	Pathankote .		50,000	1,200	3 8	4	0 13	5	0	8	. 0
.56	Hariana .	•	6,000	1,080	4 2	8	2 0	0	2	5	ŧ
57	Dasuya .		6,000	960	6 4	0	2 9	0	1	0	31
.58	Mukerian .		8,000	1,460	8 3	6	3 2	71	0	8	6
59	Miani		3,000	676	1 0	7	7 1	7	0	11	10
.60	Una		8,000	730	Nil		1 3	3	0	1	31
ßl	Jullundur .		1,45,000	14,400	0 8	10	Ò 9	7	0	1	51
62	Phillaur .		8,000	960	0 8	4	0 8	;	0	2	0
<i>6</i> 3	Hoshiarpur .			2,880	0 11	11	0 9	0	0	1	8
64	Abohar		20,000	2,880	0 11	1	0 9	0	0	1	8
65	Ludhiana .		1,52,000	14,400	0 11	3	0 9	7	0	1	5
66	Jagraon .		30,000	2,400	0 1	7	0 9	7	0	2	0
67	Khanna .		20,000	1,440	0 7	9	0 10	8	0	2	5
.68	Abmala .		52,000	5,760	0 11	11	0 12	0	0	2	0
.69	Abdullapur .		10,000	1,680	0 9	0	0 9	2	0	2	10
70	Sonepat .		60,000	1,942	0 2	1	0 15	9	0	2	6
71	Hansi		40,000	2,240	1 0	8	0 5	11	0	0	0
72	Gurgaon .		15,000	600	0 9	7	0 12	91	0	0	6
73	Hissar		32,000	6,000	0 2	5	0 5	1	0	7	5
74	Amritsar .		5,08,000	2,000	5 2	7	1 2	0	0	3	1
75	Jagadhri .		20,000	2,800	0 11	1	0 9	0	0	2	11
76	Ferozepore .		48,000	4,800	0 10	0	0 9	0	0	1	8
77	Gurdaspur .		30,000	2,000	4 8	5	1 2	0	0	2	101
78	Tarn Taran . RASJATHAN		10,000	2,000	5 11	8	1 3 1	10	0	, 1	4
79	Alwar		55,000	4,380	4 9	3	1 5	3	0	3	10
<b>B</b> 0	Udaipur City		60,000	5,400	Nil		1 2	8	0	19	4
	Grand total for 80 centres .		• • •	••	105 11	4	123 4	5	22	12	
	Average value per centre .				1 5	2	1 8	8	0	4	5

- APPENDIX E

Compost production from Urban refuse—Statistics of production and distribution for the quarter ended 31st March 1950.

si. No.	Name of State	No. of compost centres	Vol. of compost prepared during the quarter	Vol. of compost sold during the quarter	Vol. cf compost sold from 1-4-49 up-to- date	Vel. 62 unsold Compost (Old and New) in stock at the end of the quarter
			C. ft.	C. ft	C. ft.	C. ft.
ì	Ajmer-Merwara .	4	1,39.189	65 91 5	2,66,555	6,81,240
2	Bhopal	1	53,200	15,400	92,300	1,71,700
3	Bihar	19	3,89,874	2,17,623	9,71,601	17,22,296
4	Bombay	143	27,60,950	27,12,910	68,38,000	66,20,970
5	Delhi	4	5,67,015	5,67,015	14,33,280	•
6	Hyderabad State .	39	1,96,632	4,54,526	6,99,445	3,71,507
7	Madhya Bharat .	51	4,78,700	5,11,625	11,46,350	15,98,575
8	Madhya Pradesh .		· · ·		••	
9	Madras	86	15,33,873	15,08,586	51,69,469	43,87,928
10	Mysore State	89	2,51,858	2,02,389	25,83,349	8,04,284
11	Orissa	16	1,12,667	71,900	1.24,305	4,51,395
12	P.E.P.S.U.	1	1 17,020	10,395	62,380	32,130
13	Punjab (I)	43	10,03,760	4,83,480	10,80,330	18.20,910
14	Travancore-Cochin State.	, 20	1,28,032	2,39,691	l   5,06,0 <b>3</b> 0 	1.29,525
15	Uttar Pradesh ,	220	45,82,200	38,08,740	1,10,37,080	1,06,40,18
16	West Bengal	30	2,75,589	1,68,359	3,93,679	11,31,816
17	Calcutta Sludge	1	2,63,050	2,63,050	3,50,175	
18	Scheme. Calcutta Cowdung Compost.	1	23,525	23,525	35,150	
19	Bombay Cowdung Compost.	1	5,39,500	5,39,500	12,20,250	
	Total .	799	1,33,16,634	1,19,30,629	3,69,52,728	3,05,64,47

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# APPENDIX E-contd.

# COMPOST PRODUCTION FROM VILLAGE REFUSE.

Statistics of the half year from 1st April 1939 to 30th September 1949.

Serial No.	State	No. of villages operating	Vol. of Compost prepared during the half year	Vol. of compost applied to land during half year	Qty in stock at the end of the period
			Cu. ft.	Cu. ft.	Cu. ft.
1	Ajmer-Merwara .	47	71,110	Nil	71,110
2	Bombay	5,154	82,82,000	114,42,800	140,03,450
3	Madras	3,714	7,89,500	6,80,800	9,30,406
4	Mahya Pradesh .	716	9,85,391	43,025	9,42,366
5	Orissa	7,022	75,57,394	112,49,425	50,86,349
6	Punjab	673	39,27,190	30,14,950	28,77,830
7	Uttar Pradesh	21,943	589,40,800	459,36,500	129,04,300
	Total	39,269	805,53,385	723,67,500	368,15,811

# NOTE

This Bulletin is intended for the information of Officers engaged in operating Compost Schemes, in order to keep them posted with the latest scientific and practical developments taking place in their field, in India and abroad. It must be understood, however, that the views expressed in this bulletin are not binding on the Government of India.

# COMPOST BULLETIN

# (A QUARTERLY REPORT OF COMPOST DEVELOPMENT IN INDIA)

lesued by the Director of Compost, Ministry of Agriculture, Government of India

Vol. 3 No. 3]

[September, 1950

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# COMPOST BULLETIN

Vol. 3, No. 3, Sept. 1950

#### **NOTES**

# 1. Vana Mahotsava (Tree Planting) Celebrations.

A new festival has been added to our calendar, which promises to equal in importance others such as Independence Day and Mahatma Gandhi Jayanti, viz., Vana Mahotsava or the Festival of Trees. This has been due to the ingenuity, foresight and untiring propaganda of our Hon'ble Minister for Food and Agriculture, Hon'ble Shri K. M. Munshi, who has pointed out to the country the imperative and urgent need for executing an active Tree Planting campaign, if the country's agriculture is to be saved from the slow and steady deterioration that is overtaking it in the form of expanding desert areas.

Speaking at a Delhi meeting on 29th May 1950, he said,—

"I want you to help me with the 'Vana-Mahotsaya' programme which is going to be inaugurated on the 1st of July 1950 as a national festival. When I said at Bombay 'Trees are water, water is bread, bread is life', I was not merely uttering a well-turned sentence. Scientists will tell you that man cannot exist on earth but for the green glory of the forest. But the race of men has been committing collective suicide, for they are the worst enemies of trees, cutting and burning greedily and recklessly. In our country, we have turned forests into deserts and we are facing famine today. I am not exaggerating, but the real enemies of India are the oncoming deserts. Some of our deserts, the Rajputana desert, for instance, is marching at the rate of 1 mile per year. We must, therefore, unite to fight this greatest menace to our existence in this country. This is a matter of life and death. I read somewhere that without fairplay to Earth. cannot live physically; without fairplay to the neighbour we cannot live socially. But both these principles are inter-dependent. Many nations on earth have woken up to this menace. In Columbia, for instance, there is a legislation which compels the growing of trees, there is a park and tree-tax. Incidentally, trees can make our cities and villages beautiful. I, therefore, appeal to you friends and the whole country to make this 'Vana-Mahotsava' a great success but we must begin at home."

That the 'Vana Mahotsava' celebrations proved a grand successthroughout the country is shown by the following report, which appeared in the press:—

The "green glory of the forest" for which India has been famous. through the centuries was revived on July 1, 1950, when hundreds of thousands of men and women all over the country celebrated 'Vana Mahotsava'. Modern civilisation has bestowed on humanity numerous means of contributing towards popular welfare but most of these means are costly and some are associated with adverse consequences. this point of view tree planting stands in a separate category. With less cost as compared to other welfare activities, its benefits are enormous and permanent. Trees provide shade, give fruits, flowers and timber, bind the soil, produce useful medicines from their roots, leaves, barks, flowers and fruits and prevent the spread of deserts. In fact, they are the Nature's sentinels standing guard over Mother Earth protecting her against decay and providing cover against high winds and floods.

Addressing a Conference of Food and Agriculture officials in Bombay on May 22, Mr. Munshi urged the need for more trees and referred to large-scale destruction of forests that had been going on during war time, and subsequently by many zamindars and rulers in anticipation of their being deprived of the ownership and control of the forests. Cutting down of trees not only reduces the rainfall but also prevents the required fuel supply from reaching the cultivators who in consequence are compelled to use cow dung. a valuable manure, as fuel. This constitutes "a serious national loss", he said, Speaking later to the citizens of Delhi, Mr. Munshi said: "Scientists will tell you that man cannot exist on earth but for the green glory of the forest. But the race of man has been committing collective suicide. for they are the worst enemies of trees, cutting and burning greedily and recklessly. In our country, we have turned forests into desert and we are facing famine today."

This wanton destruction of the vegetable cover of the soil has to be halted. In order to arouse popular enthusiasm, the Ministry of Agriculture launched the Vana Mahotsava Campaign which is proposed to be a regular feature in the subsequent years. This year, the official celebration of Vana Mahotsava which was originally fixed during the 1st week of July has been extended upto the end of August with a view to taking advantage of the monsoon rains throughout the country.

The President of the Indian Republic in a personal message to Mr. Munshi accepting his invitation to plant the first tree at Rajghat said: "Our thickly wooded forests were at one

time a pride and envy of our land; not only did they provide an ideal Sanctuary to Seekers after Truth, but, being instrumental in ensuring ample and timely rainfall, they made a mighty contribution to our agricultural prosperity."

The celebrations which were inaugurated in different parts of the country by popular leaders aroused intense enthusiasm and scenes reminiscent of a great national festival were witnessed. In West Bengal maidens sang and danced in praise of Vana Mahotsava and an acharya from Santi-Niketan chanted mantras from the Upanishads when His Excellency Dr. K. N. Katju, the Governor, inaugurated the week by planting a Bakul tree in the Deshbandhu Park. In Madras, Poet Shri V. Ramalingam Pillai composed a special song "Vana Mahotsovam" which was sung with enthusiasm by the boys and girls. In Bombay, the students of J. J. School of Arts, produced a large number of posters depicting all aspects of tree planting and the benefits they render to the people.

According to the targets originally fixed by the States for tree planting in their areas, nearly two crores of trees are likely to have been planted throughout India during the Week. These targets are: Madras—40 lakhs; Bombay, Mysore and Madhya Pradesh—25 lakhs each; U.P., and Bihar—15 lakhs each; West Bengal, Orissa and Hyderabad—10 lakhs each; Saurashtra—5,60,000; Madhya Bharat—3 lakhs; Punjab and Assam—2 lakhs each; Bhopal—1,70,000; Travancore-Cochin Union—1,50,000; Rajasthan, Himachal Pradesh and Vindhya Pradesh—1 lakh each; Ajmer—50,000 and Delhi—20,000. These figures relate only to planting undertaken under the auspices of the Government or public institutions and organisations and do not take into account planting of trees by private individuals on their own initiative.

Vana Mahotsava was inaugurated in Delhi at 8 A.M. on July 1, 1950, by the President of the Indian Republic, Dr. Rajendra Prasad, when at Rajghat, the sacred spot which enshrines the last remains of the Father of the Nation, a tulsi was planted by him in the presence of the Prime Minister, the Ministers of the Central Cabinet, members of the Diplomatic Corps and other distinguished citizens. Similar celebrations were held throughout the country, the Governor and the Chief Minister of the State taking the lead in their respective areas.

Madras which had planned to plant the largest number of trees, in addition to planting 500 trees in every village, launched a 5-year programme of avenue plantation costing Rs. 30 lakhs. Inaugurating the scheme Mr. K. M. Munshi, Union Minister of Food and Agriculture, urged on other States to undertake similar schemes and suggested, if necessary, legislation compelling every land-owner to plant 10-

- trees for every two acres of land and to prevent felling of a tree without planting two more trees. Further, legislations may also be passed, he said, for securing for every town and city a park and funds for planting trees in squares, roads and river sides.
- The Government of Madras have also constituted a Standing Committee with the Commissioner of Food Production as Chairman to pursue the tree planting programme of the State.
- In Bombay, ceremonial planting was done by the Governor and Ministers in several places in the State. Mr. K. M. Munshi, Central Food Minister, speaking during the tree planting ceremony at Hansraj Morarji Public School at Andheri pointed out that India's culture was inter-woven with bountiful nature as symbolised in Tulsi-pooja, Giri-puja and the description of Lord Krishna as 'Kunj Bihari' in devotional literature. Later in Saurashtra, while planting a tree at Dehotsarga where Lord Krishna sought eternal rest, he said that the Great Master choose a tree as His last resting place before shaking off his mortal coil.
- The celebrations in West Bengal were inaugurated by His Excellency Dr. K. N. Katju, Governor, when he planted a Bakul sapling in the Deshbandhu Park, North Calcutta, Dr. B. C. Roy, the Chief Minister, planted at Gandhi Ghat on the Hoogly, about 14 miles from Calcutta, a Bo tree, one of descendants of the sacred Bo tree under which Lord Buddha sat more than 2,500 years ago.
- In the Uttar Pradesh, the Vana Mahotsava week was inaugurated at Naini Tal by the Governor. The Chief Minister, Pt. Govind Vallabh Pant, planted several fruit trees at his official residence, Brooklyn, in Nainital. In a message on the occasion, Pandit Pant said: "Considerable damage has been caused to the economy of the State by our indiscriminate destruction of trees. In older days cutting of trees was looked upon with disfavour while planting of new trees was regarded as a meritorious act. Importance of forests and trees for a balanced economy and national self-sufficiency cannot be over-emphasised especially in a predominantly agricultural country like ours."
- In Bihar the campaign was inaugurated by the Governor, H. E. Shri M. S. Aney, by planting a *lichi* tree at Kanki agricultural farm. A feature of the function was the distribution of 500 fruit plants by the Governor to women hailing from different villages in the area so that these villages could also participate in the campaign.
- In Madhya Pradesh, the campaign was inaugurated by the planting of a tree at Government House. In the Punjab, the Chief

- Minister, Dr. Gopi Chand Bhargava, inaugurated the week by planting a sapling of acacia in the Circuit House, Ambala. In Assam, the Governor, H. E. Shri Jairamdas Daulatram, planted a tree at Lady Hydari Park at Shillong. The Government declared a holiday on the first day of July and all educational institutions and offices except the courts remained closed.
- The Indian Army fixed July 15 for celebrating Vana Mahotsava. General K. M. Cariappa, Commander-in-Chief, in a message to the Army called for special effort to make the tree planting campaign a success. The Army started its tree planting campaign last year and since then 1.93.000 trees have been planted.
- Protection and after-care of trees planted have been specially emphasised by the Government of India. In a number of communications addressed to the State Governments, they were asked to keep in mind the need for enlisting popular support and to ensure proper steps being taken for the protection and after-care of the trees planted.
- Trees which are planted for afforestation will be looked after by the Forest Departments while those planted in the compounds of Government buildings or public institutions will be looked after by the authorities of such institutions. For protection of trees planted in village areas or by road sides, etc., district development boards and village panchayats are generally responsible. To encourage planting and to ensure after-care, a large number of prizes are being awarded in all the States. In addition, the Government of India will also give a number of prizes.
- The Central Forestry Board which was recently constituted with representatives of the Central and State Governments for co-ordinating development of forests will also watch the progress of tree planting in different States.

# Bharatiya Vana Premi Sangh

- In addition, the Central Food Minister has sponsored the formation of a non-official organization of persons interested in forests and trees. The Bharatiya Vana Premi Sangh, is on the lines of similar associations in Canada and the U.K. The President of the Indian Republic has agreed to be a patron of the Sangh and the Prime Minister has agreed to be a member of the Executive Committee. Persons who contribute 100 trees during Vana Mahotsava can be members of the Sangh. A nominal fee of annas eight has been prescribed for membership.
- Under the auspices of the Vana Premi Sangh schemes are being prepared to induce occupants of land adjoining public roads

and railway lines to plant fruit trees on the fringe of such public land, on condition that the planter looks after the tree and in return has the right to take the fruits and the timber after a fixed number of years. The scheme is being worked out by the Centrally Administered Areas and the Railways and also by the Governments of Bombay, Saurashtra, Madras, Mysore and Travancore.

### 2. Six years of Compost Development in India.

It is now six years since the Grow More Food campaign was inaugurated and the Compost programme has been making a substantial contribution to the success of the above campaign. A detailed report of the progress of urban and rural compost production in India during the year 1st April, 1949—31st March, 1950 is given in Appendix "A" to the present issue of the Bulletin, from which it would be seen that 12,09,089 tons of urban compost and 44,24,721 tons of rural compost were produced during the year. Urban compost is to a great extent used for growing potatoes, vegetables and fruit crops, and the extra food production obtained is estimated at about 50 maunds (about 2 tons) by application of about 10 tons of manure per acre. Thus the application to land of 12:1 lakh tons of urban compost produced during 1949-50 may be expected to have supplied us with about 2-lakhs tons of extra foodstuffs. In the case of rural compost, the manure is mainly used for cereal crops and an extra yield of 2-3 mds. is expected by application of about 5 cartloads (or 2 tons of manure) per acre and the 44.25 lakh tons of rural compost may be expected to have increased our supply of food grains by about 11 lakh tons. In all, the compost campaign executed during 1949-50 is estimated to have given us results to the extent of about 3½ lakh tons of extra foodstuffs.

The above results, however, are small as compared to what the Compost Campaign can do if carried out on more intensive lines upto its potential capacity. At present 1,000 towns are preparing 11 lakh tons of compost but we have got in all about 5,000 towns and these can produce easily about 50 lakh tons of compost manure per year, which by itself can give us about 10-lakh tons of extra foodstuffs in the form of potatoes, vegetables and fruits. What is needed is, (a) legislation to compel all municipalities to undertake compost making up to their full resources and (b) provision of loans to municipalities for purchase of land, motor trucks, carts etc. to enable them to collect refuse and prepare compost. The programme is simple and in view of the success that has attended us in tackling 1,000 municipal centres, it may not be difficult to extend the process to all the 5,000 centres, if the State Governments could make a concentrated effort in the above direction during the next 2 years.

As regards rural compost, only the fringe of the problem has been tackled so far. The campaign has been extended to about 80,000 villages only out of total of 5½ lakhs villages in this country, mainly due to the limited staff possessed by the Agricultural Departments in

the States. What is needed is a vigorous drive with the help of the Revenue staff, who are far more numerous, in order to see that the compost campaign is extended to all the 5½ lakhs of villages in the country during the next 2 years. The stage has come when compulsory legislation of the type passed by the Punjab (I) Government (vide pp. 33—39 of this Bulletin) is passed in all States and the Revenue authorities are made responsible for enforcement of the legislation to see that all the manure produced in the villages is kept in pits instead of in overground heaps. This one item alone would increase our production of manure in the villages by about 25 per cent. or about 500 lakh tons for the whole country. 500 lakh tons of additional manure could easily yield an extra of 20 lakh tons of food-grains, sufficient to stop the present imports of food-grains into the country.

The above programme of stepping up urban compost production to 50 lakh tons per year and of rural compost to 500 lakh tons would therefore supply us about 20 lakh tons extra food grains and 10 lakh tons of subsidiary foodstuffs like potatoes, vegetables and fruits and the scheme is capable of solving the food problem of the country, if it be executed with vigour and enthusiasm by all the State Governments. It does not require much capital expenditure or special equipment.

### 3. Utilization of wool and leather wastes as Manure.

Exact statistics of the quantity of wool waste produced in India are not available, but from the total sheep and goat population of the country, it may be estimated that about 20,000 tons of wool waste should become available for utilisation, spread out at a large number of centres where wool is spun into yarn or made into cloth.

Wool wastes consist mainly of the "dust" produced when wool is spun into yarn, the "shearings" produced when the yarn is made into cloth and also the "washings". The shearings contain about 4-6 per cent. nitrogen, the "dust" about 2.5-5.0 per cent. nitrogen and the "washings" about 0.5 per cent. nitrogen.

Wool wastes are rather a slow acting manure, but the availability of the nitrogen can be increased by fermenting the wastes for a period of 5-6 months in pits with the addition of wood ash, cowdung or urine earth in alternate layers of 6" thickness of wool wastes and 1-2" thickness of wood ash, cowdung, etc. Where large quantities of wool wastes are available, they may be treated with steam under pressure (in an autoclave) or with acid, when a product richer in nitrogen (9-10 per cent. N.) is obtained. The above steam or acid treatment or the simple system of composting is recommended in order to destroy any pathogens or weed seeds that may be present in wool wastes.

Experiments carried out at Rothamsted have shown that wool wastes show good results on all crops and even on heavy soils. Composted wool wastes were as good as the acid or steam treated product.

The "washings" from the woollen factories should be first treated with lime or other chemicals in order to precipitate the solids, before

the effluent is utilized for agricultural purposes or allowed to flow into the town sewers. The sediment or sludge contains about 0.5 per cent. nitrogen, 0.12 per cent. phosphoric acid and 0.28 per cent. potash and can be used as manure.

A considerable amount of "wool fat" can also be recovered from the wool washings, by treatment with suitable solvents. It has been estimated that 1 lakh pounds of raw wool would yield about 15,000 lb. of wool fat (lanoline) and 5,000 lb. of potassium carbonate. The "fat" can be used as food and for making soap.

#### Leather Wastes

Leather waste, as ordinarily obtained, forms a slow acting manure containing from 6 to 10 per cent. nitrogen. When applied to the soil in the raw condition, it decomposes even slower than horn or hoof meal and shows its full effect only after a period of 4-5 years.

It is possible to hasten the availability of the nitrogen contained in the leather waste by subjecting the material to preliminary treatment, either by chemicals or by fermentation. An addition of a small percentage lime or wood ash and keeping the mass moist hastens the decomposition of the material, but the process if not properly controlled, leads to losses of nitrogen due to the alkalinity of the reaction. Treatment with dilute acids at high pressures and at higher temperatures has been tried, but this involves special equipment and high operation charges.

It is possible to decompose leather waste into manure with the help of biological action by interspersing thin layers of leather waste between layers of organic refuse e.g., farm or cattle shed litter, mixed with cowdung, and cattle urine as starters. The intense biological action which is set up in the process, due to the activity of fungi, bacteria and other complex micro-flora and the high temperatures that are developed, serve to decompose the leather waste, which in about 5 to 6 months time becomes converted into decomposed material. To obtain satisfactory results it is necessary that the proportion of leather waste should be about 25 per cent. or less of the total compost material. If the leather waste is not fully decomposed in the above period it would be necessary to remove the same by screening the manure at the end of 5 to 6 months, and to add the material again to a fresh compost lot in order to decompose it completely.

# 4. Gram Sudhar Saptah in Saurashtra.

The Saurashtra Government observed a Gram Sudhar Saptah in their State during the week from 21st—27th May, 1950. The object of the celebration was to improve the economic, social and cultural life of the villagers, with special emphasis on the immediate need for agricultural production. In a circular issued by the Government the following programme of work was chalked out:—

(1) The local workers will call a meeting of the villagers and explain to them the necessity and importance of this week

and its effect on village life. In addition the week will begin with taking out Prabhat Pheries (morning processions), flag salutation and village cleaning on the lines we celebrate the birthday of Mahatma Gandhi.

- (2) To effect village improvement.
- (3) To dig pits of farm yard manure.
- (4) To collect all the rubbish from the village and put it into pits.
- (5) To try to spread unity amongst the village people.
- (6) Arrangements for nightsoil disposal. To keep light portable latrines after providing small drainage pits.
- (7) To construct new wells, repair old wells and prepare an estimate about the scheme.
- (8) To go into the projects of contour bunding and fix the number of Bighas, *i.e.*, area that will receive protection from such bunds annually.
- (9) To hold discussions about improvement of pasture lands.
- (10) To prepare silo pits for preservation of grass.
- (11) To help formation of multi-purpose cooperative societies with a view to improve the village life and be of help during the time of famine.
- (12) To try to rehabilitate the unprotected and collect funds for opening free reading rooms, etc.
- (13) To repair the village roads.
- (14) To make arrangements for keeping cleanliness of drinking water.
- (15) To make propaganda with a view to disuading village people from bad habits.
- (16) To make efforts to develop village industries such as spinning and hand loom work and leather industries.
- (17) To make efforts to use improved implements, manures and good seeds; and all the village government officers and educational institutions, should strive to encourage cussions on this subject to improve food production.
- (18) Tree planting during the week.
- (19) To fix a programme for different games.
- (20) To impart a proper understanding about improving the cattle wealth of the villages.

In comparison with the Bombay Programme for the Gram Sudhar Week, the Saurashtra programme would appear to be too ambitious and discursive. It includes too many items. It would be better to concentrate on a few items during the week, so that substantial results may be obtained during the week. With this object, the Bombay Government have rightly selected the items of village cleaning, digging of pits and manure preparation for concentrated attention in all villages of the State during the Gram Sudhar week. As far as Tree Planting is concerned, a special week viz., Vana Mahotsava has been assigned for that purpose starting from July 1st. As regards other items such as repair of wells, roads, contour bunding etc., silo pits, formation of multipurpose cooperative societies, development of cottage industries, improvement of live stock, provision of social amenities like literacy, reading room etc., it would be advisable to tackle these issues in separate weeks of the year, so that the village public may not be confused with too many items at the same time and some substantial work can be carried out in the Week, instead of discursive talks and plans on too many subjects.

# 5. Utilization of Village Night Soil.

One of the secrets of the high yields of rice in China and Japan is the meticulous care with which the whole of the human excreta is applied to land as manure. Shri Chaman Lal in his recent book on Cottage Industries and Agriculture in Japan (New Book Co. Ltd., Bombay, 1949) gives an interesting example of the great value which the Japanese attach to nightsoil:—

"Japan is the most modern country in Asia, yet she faithfully clings to the old practice of preserving the night-soil in the homes, in towns and in the fields and in the villages. I established a home in Tokyo, I wrote to the Municipality to send me a sweeper twice daily to clean the toilet. request shocked the officer-in-charge who wrote back saying that as a special favour he was prepared to send me a sweeper every tenth day although regular collection of from homes was made only once a month. Every home is provided with a disinfectant which is used twice daily to deodorize; and the night-soil is preserved in a deep pit until the sweeper comes on his round with a clean wooden container (not the open buckets as used in India). The containers are loaded on carts and sometimes on animals. used to be carried by sweepers too, but the practice has been abandoned. How I wish the sweepers in India could be provided with the same facilities. I asked an official in Tokyo "Why don't you flush the entire night-soil out into the sea?" He reported: "That would be waste. We throw nothing away. It is worth much money." The peasant realises the value of night-soil so much that he invites passengers on the roads to use his field lavatory for his

benefit. Notice boards on the roadside invite passers-by for profit to the owner of the field. Manure is like gold to the peasant."

In India we are at present operating a Town Compost Scheme, which is making satisfactory progress from year to year, but nearly three-fourths of our population live in the villages and there is no scheme now for conserving such village night-soil and using it as manure. The human excreta of the 250 millions living in our 5½ lakhs villages contain nearly 10,00,000 tons nitrogen and 200,000 tons phosphoric acid equivalent to about 50,00,000 tons ammonium sulphate and 11,00,000 tons superphosphate valued in all at about Rs. 120 crores. This huge quantity of manure is at present going to waste, due to ignorance of its value, popular prejudice and absence of a proper organization whereby the above excreta could be collected and utilized.

The Central Manure (Compost) Development Committee drew the attention of the State Governments to the huge magnitude of the above waste and recommended the introduction of the Wardha system of Trench Latrines in villages. The Madhya Pradesh and Bombay Governments took special interest in the matter and sanctioned loans and grants of money to Village Panchayats for construction of such latrines and special local Committees were appointed to study the matter and devise further improvements in the system. The details of the methods so worked out in Madhya Pradesh and in Bombay States are given in Appendix B and would prove of use to other States in devising suitable systems for their areas.

# 6. Students and the Compost Campaign.

The important part which students and school masters played in making a success of the Gram Sudhar Week in Bombay State during October 2nd—8th, 1949, has been referred to in the December, 1949 (Volume 2, No. 4) issue of the Compost Bulletin. Another State in which students and schoolmasters are playing a similar vital role in making a success of the Grow More Food Campaign in Orissa, as shown by the following extract from a recent Report received from that area:—

"In the Province, the Village School children were setting an example to their elders by going round their villages once a week along with their masters, sweeping the roads and surroundings and converting the refuse into manure. The practice has been adopted with a view to making the children manure minded. In the district of Boudh and Phulbani in every week, Sunday is being observed as "Compost day". On that day, all the Agricultural staff of the district are visiting a selected village and inducing the villagers by demonstration of compost making to prepare compost. If such a practice would be adopted in other districts, it would be very easy to achieve our aim.

"In order to utilise the services of Matriculation, I.A. and B.A. examinees after their University examinations, for popularising the methods of production of compost in rural areas. meetings of the Matriculation examinees were organized at all Districts and Sub-divisional Headquarters Province. The Revenue and Public Relations staff participated in the functions. To give an incentive to the students to carry on this work in the urban and rural areas during their leisure time, 3 prizes of the value of Rs. 15, Rs. 12 and Rs. 10 were kept in each sub-division for 3. students who would be adjudged as having done the best work in this regard. In addition to 3 prizes for each subdivision, the 3 boys who would be adjudged the best in a district would get an additional prize of equal amount, i.e., the best boy in a district would get Rs. 15 for being best in the district and Rs. 15 for doing best in the sub-division".

# 7. Compost Development in Hyderabad State.

A scheme for composting urban refuse was started in Hyderabad State as early as 1944, but due to the disturbed political conditions in 1946-48 it had a set-back. After the restoration of normal conditions, however, work has been restarted on intensive lines. At the suggestion of the Government of India, Hyderabad Government have recently amended their Municipal Act (vide Appendix C) so as to give power Government to compel all municipalities to At present about 40 municipalities out of a total compost making. of 73 municipalities and 15 Town Committees in the State are preparing about 12,000 tons of manure, but there is scope for increasing the production to a level of 100,000 tons within a few years. The Director of Compost to the Government of India, who toured round the State in June, 1950 has put up proposals for increasing the production of urban compost to a level of 50,000 tons during 1950-51 and 100,000 tons during 1951-52, with the help of the compulsory provisions recently framed in the Municipal Act and by advance of loans to municipal bodies for purchase of land, motor trucks, etc. Out of the 73 Municipalities and 15 Town Committees, the 'big five' viz., Hyderabad, Secunderabad, Warangal, Gulbarga and Aurangabad possess 60 per cent. of the total urban population of the State and could supply 100,000 tons of manure, if they are properly organized.

Proposals have also been framed for starting an intensive drive for rural composting in the State with the help of the Agricultural and Revenue staff. Out of the total number of 22,360 villages in the State, 5,000 villages will be taken up each year and a target of 100,000 tons has been fixed for 1950-51 and 5,00,000 tons during 1951-52. Demonstration centres will be opened at each Taluk headquarters, at which the revenue staff of Village Patels and Patwaris will be trained in the improved methods of manure preparation.

In addition to the increased manure prepared in villages, there is scope for the composting of water hyacinth in the tank areas and of

sugar cane trash available on 45,000 acres under cane in Hyderabad State.

# 8. Pits Vs. Heaps in Manure Preparation.

The main drive for improved manure production in the villages is concentrated on two items viz., (1) the storage of manure in pits instead of in overground heaps and (2) the absorption of cattle urine by spreading litter or earth under the cattle in the urine zones of the cattle shed and the addition of such urine soaked litter or earth every day to the manure pit. Emphasis has been laid on these two points, since at present about 150 million tons of third rate manure containing about 0.3-0.4 per cent. nitrogen (on fresh basis) is prepared in the villages and if the improved methods be adopted, and if the pits are filled up according to the method of sectional filling, the quantity of manure prepared could be increased 50 per cent, and its quality can be doubled in respect of nitrogen. This would mean the saving and addition of 1:5 million tons of extra nitrogen to the soil which would produce about 10—15 million tons of extra foodstuffs—sufficient to make the country self-contained in foodstuffs for several years to come. programme could be carried out purely by intensive propaganda and with the help of suitable inter-village and individual competitions for best manure production and by the issue of certificates of merit to such of the Revenue and Agricultural Officers and non-official workers who show the maximum output of work in each area.

The importance of the subject is such that it has attracted attention all over the world including the U.S.A. The American News File 5th October, 1949, carries an interesting article offering scientific support to the soundness of the drive launched in India.

"Farmers for centuries have known that manure aids the growth of crops by enriching the soil. Research has been conducted during recent years in the United States to measure the nutrient value of manure and to find the best methods of conserving and utilizing its soil-enriching qualities.

"The tests show that many farmers fail to get full benefit of its use as a fertilizer. For example, a study at the Iowa State College Experiment Station showed that farmers who pile barnyard manure in the open may lose as much as 70 per cent. of the soil nutrient value through leaching by rain and snow."

# Yields on Manured Plots Bigger

"In tests to determine the value of manure, a four-year rotation of corn, oats clover and timothy hay was followed on a number of plots. Manure was applied to some plots and not to others. While good crop yields were obtained on plots not manured, merely by crop rotation, the yield of all crops planted on manured plots was increased, even though the soil on which it was used already was very fertile. For example, the corn crop was increased by 20 per cent. and the clover hay crop by 27 per cent. On the basis of experiments conducted since

1915 the Iowa researchers say that, on the average, 84 acres of cropland receiving manure will produce as much food as 100 acres without manure."

Further testimony that manure is valuable and that farmers often waste is given by William P. Kintzley, farm Manager of Colorado Agricultural and Mechanical College in the United States. He notes that farmers often place their barnyards on a slope so that they will drain and dry quickly after rains.

"But such sites often prove disastrous to the fertility of the farm, unless the seepage from manure-packed yards is carried to crop fields", he says. "Unfortunately, the run-off is carried too often to a draw or creek, and the valuable plant nutrients are lost to the farm entirely."

As remedies, he suggests that the litter of the barnyard be saved and returned to the crop fields as promptly as possible. In cases where weather and field conditions prevent spreading manure, especially during a part of the winter and spring seasons, the barnyard manure should be piled in a place where the seepage will run to crop land until the bulk can be spread. Other methods of saving the run-off, he says, include building a curb at the lower end of a sloping barnyard or digging an open ditch that will carry it to crop fields.

That the run-off contains much of the soil-nutrient value of manure is seen in tests at the Colorado experiment station. The ability of manure to increase crop yields is due largely to its content of nitrogen, phosphorus and potassium. But in the average manure 50 per cent. of the nitrogen and phosphorus and 75 per cent. or more of the potash are readily soluble and easily washed out if the manure is leached by rain and snow.

Kintzley says: "The nutrients that sustain life must be brought into existence by the growth of plants and they in turn must have decomposed organic matter and minerals released from the soil to reproduce themselves. The endowments of a generous Providence were not bestowed upon us with a fool-proof guarantee and they can be squadered unless we use intelligence in our management. We cannot retrieve what we might have saved, but we can save now what we may lose in the future."

# 9. Central Board of Forestry.

The Government of India have constituted a Central Board of Forestry to secure close coordination in forestry matters and more specially in integrated land use and help in maintaining adequate standards in forestry education. It will consist of the Union Minister of Agriculture as the Chairman and the following members:—

The Ministers in charge of Forests of Groups A and B States and of two of the Group C States, the Secretary to the Central Ministry of Agriculture, the Joint Secretary, Central Agriculture Ministry (Ex-Officio Secretary), the Inspector General

of Forests, Government of India and the President, Forest Research Institute, Dehra Dun.

The functions of the Board will be (1) Coordination and integration of forest policy pursued by States in the management of their forests; (2) The adoption of conservation measures affecting forest resources and soil; (3) Integration of plans for land use and national reconstruction in which forestry has come to play a progressively important role; (4) Promotion of legislation considered necessary for various State for the management of private forests; (5) Regulation and development of forests in inter-state river valleys, which are the concern of the Central Government; (6) Maintenance of adequate standards of training of officers; (7) Coordination of forest research conducted in Central and State Institutes and (8) any other matters affecting forestry, which are relevant to the objectives of the Board.

With the urge for the industrial and agricultural development of the country generated by recent constitutional changes, forestry has come to assume a vital role calling for concerted action in such inter-state matters as soil conservation and flood control measures, development of industries and standardization of timbers, evolution of forest management and legislation for the control of private forests, regulation of river valleys and preservation of tree growth in headwaters.

The Board will meet at least once in two years.

The Chief Conservators of Forests and Secretaries to Governments will be entitled to attend meetings of the Board along with their State Ministers.

### AKTICLE

# CHARCOAL AS A FERTILISER

# By Siegfried Marian

[The following article by Dr. Marian, who has spent many years in the investigation of the properties of charcoal (he was responsible during the war for the production of charcoal for gas masks), provides an important and interesting contribution to the study of soil fertility.]

It is an old technique in certain horticultural methods to use ground charcoal in soil mixtures. This was practised in Egypt and China a thousand years or more B.C. But it may be doubted whether there was then much precise knowledge concerning the properties and functions of charcoal in its relationship with soil. As an expert on charcoal, I am frequently asked whether it is really a fertiliser in itself, and why, as a completely insoluble substance, it should exercise a beneficial influence on plant growth.

Before giving my own ideas, I will quote from a volume of "The Gardener's Assistant", published in London in 1907:—

"Charcoal forms a valuable auxiliary to manures, and even when applied to the soil without the admixture of manuring substances it has great fertilising properties. Its action in either case is almost entirely due to its well-known property of absorbing ammonia, carbonic acid, and other gases, and again giving up these substances for the nourishment of plants; for as far as the carbon of the charcoal is concerned, that yields no foods to plants. There is no doubt, however, that the mineral matters contained in charcoal, as usually prepared, contribute in some measure to its fertilising effects."

This quotation seems superficially to answer the question. There is, however, a great deal more to be said about charcoal, which is one of the most wonderful substances we can use in any form of fertilising. Its use in the right way offers in my submission a complete refutation of the theories on which artificial manuring is based. Followers of the N.P.K. school have maintained since Leibig's day that all the soil needs in order to promote adequate plant growth is the application of nitrogen, phosphoric acid and potassium in the form of water-soluble salts. If this were true, there would be no need to bother with the application of other materials like charcoal.

# Moisture and Oxygen

But horticulturists have never used charcoal for the mere fun of doing so, and they consider its use justified even with the price of ground charcoal at more than £30 per ton. The truth is, of course, that plant growth is a highly involved biological, physical and chemical process, about which we are continually learning new facts of importance, and, while it is true that plants need nitrogen, phosphoric acid and potassium for their metabolism, those three elements represent only part of what is necessary, and they will be found in a natural way

if soil and atmospheric conditions are right. I place the correct control of moisture and provision of oxygen in the soil first in importance, and if plants are properly looked after in regard to these two they will get the N.P.K. (nitrogen, phosphoric acid and potassium) they need, even though the soil at first seems poor, on ordinary methods of analysis, in these essentials.

It is widely known that plants can wilt in very wet situations, while conversely they may do well in soils that seem to be dry. What is absolutely indispensable is that moisture should be available in a condition which enables plants to take it up readily.

Now, certain soil conditions will set up very high imbibition forces, whereby great quantities of water are held. We can assess these imbibition or holding in forces in terms of ordinary atmospheric pressure, and they may reach a point equal to 1000 times that of the latter. Against such contraction, the suction forces of plant roots are quite helpless, for they vary between the equivalent of twice or ten times the amount of atmospheric pressure. In such soils plants are bound to wilt, and no amount of N.P.K. will overcome the trouble.

It is at this point that charcoal proves its unique efficacy. Due to its extremely high porosity and capillarity, it is capable of absorbing more than 150 times its own volume of gases. Charcoal stored in air will naturally be filled with air as the principal gas. If, therefore, air-impregnated charcoal is incorporated into soil such as that we have mentioned above, an exchange will take place whereby moisture will take the place of air. This absorption force of charcoal is such that it reduces the imbibition forces of soil to an extent that enables plants to take up moisture from both soil and charcoal, the latter acting as a control. Plants which are wilting in an excessively wet soil will soon recover their vitality when charcoal is added, and, similarly, a soil that is too dry will improve its moisture-retaining capacity when charcoal is mixed with it.

#### Other Virtues

In addition to having this important water-regulating virtue, charcoal helps to serve other most necessary purposes. It assists in maintaining the flow of oxygen which roots need for their respiration. Nor does the root alone need oxygen. The teeming microfauna and microflora of the soil also require it, and, when it is supplied, can complete their work in nitrogen-fixation and other subtle processes. This is a point of the greatest importance. All followers of the organic school will appreciate how valuable it is if we can provide a means of amplifying the biological activity essential to the maintenance of a healthy soil, and charcoal does this better than any other medium I know.

These dual functions of charcoal are, in fact, deeply inter-connected. Where moisture is held by soil particles with high imbibition forces, the lack of oxygen which ensues leads to a high preponderance of carbon dioxide gas in the soil atmosphere, and this in high concentration exerts toxic and narcotic influences on plant roots. Inevitably, carbon dioxide gas in the soil atmosphere leads to stunted root development.

We must consider, further, the mineral matter contained in charcoal. To be really suitable for commercial charcoal manufacture, timber must be at least 50 years old. If it is 150 years old, as some scrub oaks are (despite a girth of only three inches or so), so much the better, for what we want is density in the wood structure. During the long period in which the tree has been growing it has been collecting minerals through its roots. In the carbonisation process which reduces the wood to charcoal, this mineral content is not removed, but greatly concentrated. It requires roughly six tons of wood to make a ton of charcoal, so that in any given weight of charcoal we have the mineral content of six times that weight of wood. Moreover, as these minerals have been subjected to the metabolism of the tree, they are retained in a balanced form, and I very much doubt whether any external method could be devised whereby we could balance them so well.

I am not unmindful of the fact that, according to some people, this mineral matter is useless for plants because it is not soluble in water.

I do not contest the fact that the mineral content of charcoal is insoluble in water. What I have discovered, however, is that it is soluble in soil which contains humus. Charcoal thus has what I call another double reaction. By virtue of its mineral content it makes raw humus soluble, and it then gives forth its minerals for re-absorption by plants. In this it is unique.

This is a most fascinating link in the chain of biological and chemical reactions that go on in the soil. Only soluble humus fertilising effects, and it is the mineral matter contained in charcoal that makes insoluble humus soluble. We find it there in a perfectly balanced form; concentrated, yet immediately available for the wonderful processes that go on in the soil. In the light of what we now know concerning it, we can say that by the use of charcoal in the right condition, in combination with peat and a wide range of waste substances and with the soil itself, we can open up a new era of fertility everywhere. Nor need it be thought that by so doing we must join those who, with so little intelligence, are diminishing the wealth of the forests of the world. In Dartmoor I have shown that the removal of peat is beneficial to forest-growth, and I have replanted as I have cleared old trees. We must remember also that vast quantities of charcoal are regarded as waste in the steel industries, and I have often reclaimed big quantities that have been dumped into watercourses in factory areas.

I would like finally to say how indebted I am to the Dartington Halt Trustees at Totnes, who have put large areas of their woodlands at my disposal, and have shown confidence in my work. The Trust is one of the very few concerns which manages extensive forest areas in a truly scientific manner, and when there is too much mere plundering of forest reserves going on, their example is one to hold up to the world.

(From Country Living Book II)

(Reprinted from the Compost Magazine, New Zealand Vol. 9—No. 1, Jan-Feb. 1950).

### APPENDIX A

# Report on Compost Development in India During 1949-50

The Compost Schemes financed by the Government of India can broadly be classified into two major groups, viz., (a) Town Refuse Compost Schemes; and (b) Rural Compost Schemes.

# -1. Town Refuse Compost Schemes.

The year under review showed a steady increase on the production and distribution sides, as shown by the data given in Table I.

TABLE I—Town Refuse Compost Schemes

	Year						No. of urban centres preparing compost	Quantity 1 produced	Quantity sold
distribution of the deal						!		Tons	Tons
144-15						!	260	1,82,610	51,290
148 40						,	111	9 k9 R70	1 70 010
1946-47						ł	578	4,09,360	2,89,170
1947-48*		•				ł	566	4,86,080	3,80,5 <b>27</b>
1948-49*						. '	696	7,21,257	5,17,234
1949-50*							1,036	12,09,089	9,23,173

 $\dagger$ The data for 1947-48 and succeeding years refer to the Indian Union area after partition.

The progress of urban Compost production and distribution in the different areas during the last 3 years, and the targets fixed for the years 1949-50 and 1950-51 by the States concerned are given in Table II.

TABLE II

s.	g, ,	Produc	tion and dis	Target	Target	
No.	State	1947-48	1948-49	1949-50	for 1949-50	for 1950-51
1	2	(a)	3 (b)	(c)	4	5
	AND THE PERSON NAMED AND ADDRESS OF ADDRESS AND	Tons	Tons	Tons	Tons	Tons
1	Ајцег	*3,458 **(1,806)	3,976 (2,286)	7,904 (4,131)	7,100	15,000
2	Assam	Nil	Nil	Nil	Nıl	5,000

<sup>\*</sup>These figures denote quantities produced.

<sup>\*\*</sup>The figures within brackets denote quantities sold.

_8.	g <sub>1-4</sub>	Produc	rtion and di during	stribution	Target	Target for
No.	State	1947-48	1948-49	1949-50	for 1949-50	1950-51
1	2	(a)	3 (b)	(c)	4	5
3	Bengal (West)	7,000	12,918	18,355		
4	Bhopal	(7,000) Nil	(7,026) Nil	(7,874) 6,780	20,000 3,900	20,000 8,000
5	Bihar	12,780	18,077	(3,346) 25,961	50,000	1,00,000
6	Bombay .	(15,708) 77,714	(13,124) 119,152	(10,822) 205,614	200,000	300,000
7	Coorg	(52,923) Nil	(90,386) Nil	(160,305) 35 (23)	100	100
8	Delhi	5,447 (5,447)	14,795 (14,795)	40,796 (40,796)	40,000	50,000
9	Himachal Pradesh .	Nil	Nil	Nil	Nil	2,000
10	Hyderabad State .	5,079 (6,235)	5,033 (6,099)	11,663 (13,988)	14,000	30,000
11	Madhya Bharat .	10,000 (10,000)	13,988 (9,299)	36,997 (24,777)	30,000	50,000
12	Madhya Pradesh .	42,188 (31,432,	61,864 (42,626)	74,641 (32,774)	90,000	1,10,000
13	Madras	104,920 (76,380)	112,980 (104,168)	139,870 (130,583)	150,000	2,00,000
14	Mysore State	26,737 (17,906)	31,220 (19,786)	26,085 (51,667)	50,000	50,000
15	Опяча	2,956 (2,527)	4,670 (1,418)	7,650 (2,486)	11,380	20 <b>,</b> 00 <b>0</b> -
16	PEPSU .	Nil	Nil	1,342 (1,248)	7,500	15,000
17	Punjab (I)	5,626 (1,284)	49,310 (19,190)	54,520 (28,118)	100,000	150,000
18	Rajasthan Union .	Nil	Nil	11,926 (7,383)	3,750	21,000
19	Saurashtra Union .	Nil	Nil	Nil	Nil	12,000
20	Travancore Cochin Union.	10,215 (10,922)	9,882 (10,260)	8,670 (10,082)	14,000	18,00 <b>0</b> -
21	Uttar Pradesh	180,760 (148,630)	244,678 (205,667)	314,414 (260,130)	345,000	500,000
22	Vindhya Pradesh .	Nil	Nil	Nıl	Nil	4,000
23	Other areas and Special Schemes.*	3,011 (Nil)	17,003 (11,253)	215,966 (132,640)	W ::	0.0 0.0
	Total .	497,891 (388,200)	719,556 (557,383)	12,09,089 (9,23,173)	11,19,780	16,80,100

<sup>\*</sup>This includes compost prepared in Cantonment Board areas, Military Camps and speial schemes like Composting of Sugar factory wastes, distribution of cowdung from Bombay and Sludge Mannre from Calcutta.

# Production of Town Compost

The production was satisfactory in Uttar Pradesh which contributed 314,414 tons to the all India total of 12,09,089 tons, followed by Bombay (2,05,614 tons), Madras (1,39,870 tons). Madhya Pradesh (74,641 tons) and Punjab (54,520 tons). Bhopal made a good start during the year with 6,780 tons. Assam, Saurashtra, Himachal Pradesh and Vindhya Pradesh did not start compost production during the year. The progress in the other areas like Bengal, Bihar, Orissa, Madhyabharat, Mysore, Travancore and Cochin, and Ajmer-Merwara was, more or less, stationary, but it is expected that due to the steps now being taken in the above areas, appreciable progress will be shown during 1950-51.

In comparison with the production targets fixed for the year 1949-50, most of the States have fulfilled 80-90 per cent. of the targets fixed for them except Bihar, Orissa, Punjab, Travancore-Cochin Union and Mysore State. Since these States have fixed still higher targets for 1950-51, as compared to 1949-50, special steps would have to be taken by them in order to tackle their local difficulties so as to ensure rapid expansion of compost production and distribution in their areas. The total target for all States in India for the year 1950-51 amounts to 16,80,100 tons as compared to 11,19,780 tons fixed for 1949-50

# Legislation

Madhya Pradesh, Punjab, Pepsu, Bombay Bihar, Orissa, Mysore and Hyderabad have passed legislation to compel municipalities to convert their urban refuse into compost manure. Similar legislation is under consideration in Saurashtra, Rajasthan and other areas. The Central Government is also considering similar legislation in the Centrally administered areas of Delhi, Ajmer, Bhopal, Himachal Pradesh, Vindhya Pradesh, etc.

In addition to the above legislations, State Governments are giving loans to municipalities for purchase of land and motor trucks needed for compost making. The Government of India sanctioned Rs 5.67,500 as loans to State Governments during 1949-50 for the above purpose. It is expected that the effect of the above legislations and financial assistance to municipalities will be seen during 1950-51, for which year a target of 16,80,100 tons has been fixed.

### Distribution 1 4 1

The prejudice that formerly existed against town refuse manure has now disappeared in most areas and what is needed is mainly marketing facilities and widespread propaganda. During the year 1950-51, it is expected that about 11-12 lakh tons of compost manure would become ripe for distribution as compared to 9.23 lakh tons that were distributed during 1949-50. Special arrangements would have to be made in all States to deal with the extra quantities that will become available for distribution in their respective areas; and for this purpose Departmental Trucks may have to be stationed at the bigger centres and loans may have to be given to municipalities for purchase of their own

trucks for purpose of manure distribution. In addition, intensive propaganda should be concentrated round about towns within 5—10 miles radius in order to popularise urban manure among cultivators.

# Economics of the Town Compost Scheme

Data collected from nearly 100 urban centres go to show that there is a wide variation in the prices at which town compost is sold, ranging from a few annas per ton upto Rs. 10 per ton. This difference in price is due mainly to the considerable difference that exists in the demand for manure at different centres and to the extent to which the prejudice of the farmers against urban manure has been removed by propaganda and demonstration. Thus, in the intensively cultivated areas of Travancore, Mysore and certain parts of U.P. and Bombay, urban compost is sold at about Rs. 5 per cart-load or Rs. 10 per ton. Figures obtained for cost of production of compost (including in this only the expenses incurred at the Compost Depot) at about 80 centres (vide pages 30-32) show an average figure of Rs. 1-13-0 per ton. The Madras Government appointed a Special Officer to go into the matter and based on his report, fixed a uniform price of Re. 0-10-10 per cart-load (25 cu. ft.) or Rs. 1-5-8 per ton (50 cu. ft.) of manure for all urban centres in their area.

It would, therefore, be seen that at the older centres where sufficient propaganda has been done, the cultivators are willing to pay a price considerably higher than the cost of production of the manure by the municipality. Government's subsidy and propaganda is mainly needed at the new centres for the first year or two. The average expenditure needed, in this connection, is about As. 12 to Re. 1 per ton as shown by the following data for the last 5 years (vide Table III).

TABLE III

Expenditure on Urban Compost Schemes

	Year				Total produc- tion of urban compost	Govt. of India subsidy on urban com- post schemes	Value of extra food produc- tion Rs. 20 per ton of manurel†	
						Tons	Rs.	Rs.
<b>*1945-4</b> 6						2,82,670	1,49,676	56.5 Lakhs
<b>*</b> 19 <b>46-4</b> 7						4,09,360	2,59,849	81.9 ,,
1947-48					٠.	4,86,080	2,43,861	97.2 ,,
1948-49					.	7,21,257	5,99,676	144.3 ,,
<b>194</b> 9-50	٠					12,09,089	8,69,108	241.8 ,,
				То	tal	31,08,456	21,22,170	621.7 Lakhs

<sup>\*</sup>The figures for 1945-46 and 1946-47 refer to India prior to partition and the figures for 1947-48 et sq. after partition.

<sup>†</sup> The extra food consists mainly of potatoes, vegetables and fruit crops, calculated at 3-4 mds. extra crop per ton of manure applied (vide Compost Bulletin, Vol. 2, No. 3, p. 7).

It would be seen from Table III that Government expenditure on the urban compost scheme is repaid 25 to 30 times by the extra food produced in the country. Such Government expenditure would be needed only for some years to come till the production is expanded upto maximum potential limits, which in the case of urban compost would amount to about 50 lakh tons.

### II. Rural Compost Schemes.

Rural Compost Schemes are broadly divisible into (a) compost prepared in villages from cattle shed refuse, house sweepings, leaf-fall etc., (b) compost prepared in farms, e.g., composting of sugarcane trash and other farm refuse, (c) compost prepared in forest areas from forest leaves, (d) compost prepared from water-hyacinth and (e) compost prepared from pight-soil and urine in villages.

Schemes under group (a) have been in operation in U.P., Punjab, Bombay, Bengal, Orissa and Madras and a few centrally administered areas like Ajmer and Coorg, but during the year 1949-50, the above scheme has been also started by other States like Madhya Pradesh, Pepsu, Mysore, Bihar and Madhyabharat. Arrangements are under way to get the scheme started in the remaining States like Saurashtra, Rajasthan, Travancore and Cochin, Assam and in the centrally administered areas of Himachal Pradesh, Bhopal and Vindhya-Pradesh, so that from 1950-51, almost all the States in India would be operating the Village Compost Scheme.

In the above connection, Punjab (I) took the lead in passing a Special Ordinance (which was later replaced by a Bill) in order to compel all villagers to keep their manure in pits instead of throwing them carelessly in heaps over the ground. Similar legislation has been passed by Mysore and Pepsu and other Governments are watching the results before considering action on similar lines. The results obtained in Punjab (I) have been very encouraging, and the village compost legislation has been sympathetically viewed and actively obeyed in all the villages, and as a result thereof, thousands of pits have been dug in a few months' time. The Central Government are actively considering the application of similar legislation to the villages of the centrally administered areas of Himachal Pradesh, Vindhya Pradesh, Bhopal, Delhi, Ajmer, Coorg, etc.

As a result of the above legislative measures for village compost, it is expected that very substantial results would be achieved during 1950-51. It may be mentioned that the Punjab legislation gives power to the authorities for requisitioning lands needed in village surroundings for digging compost pits. It is expected that the better preservation of manure in pits instead of in over-ground heaps would by itself increase manure supply by about 25% i.e., by about 50 million tons or on the

average by about 100 tons extra per village. The above 50 million tons extra manure could increase our food production by about 50 million maunds or about 2 million tons.

But, the village compost drive includer in addition to the item of "filling the pits", the item of "conserving cattle urine" by spreading litter or earth under the cattle during the night time when the cattle are tied up in the Cattle Sheds or in the houses. This item would not only increase the quantity of manure produced, but would also serve to absorb large quantities of nitrogen present in cattle urine, and thus to improve the value of the manure prepared. It has been calculated that out of the 3 to 4 million tons of nitrogen voided per year by the 150 million cattle in the villages, at least one million tons could be absorbed in litter and added to manure pits: this programme alone, if carried out, would help to produce 5 to 6 million tons extra food-stuffs—enough to-wipe out the food deficit of the country.

It is, therefore, necessary that a serious attempt should be made by all State Governments to push through the Village Manure Drive as quickly and as widely as possible with the help of legislation on the Punjab (I) lines, backed up by intensive and widespread propaganda through all available Government staff in the rural areas like the staffs of the Revenue, Agricultural, Co-operative and Educational departments and also with the help of non-official bodies like Village Panchayats, Congress Committees, etc.

Gram Khad Pradarshaks should be appointed to carry out demonstrations of the improved methods of manure preparation in their respective villages. Individual competitions and inter-village competitions should be held and prizes awarded for the best performances, measured in terms of the average volume of manure prepared per head of cattle. Certificates of Merit and Medals may also be awarded to the Patwaris and Patels who show the maximum number of manure pits properly filled up in each Circle or Thana.

#### Gram Sudhar Week

The Bombay Government organized a Gram Sudhar Week during the Mahatina Gandhi celebrations during October 2nd—8th 1949, which proved to be very popular in the rural areas. The active co-operation of all official and non-official agencies like Gram Panchayats and School masters was secured by special appeals and inducements of prizes and certificates etc. The celebrations concentrated mainly on the item of cleaning the villages, collecting the refuse and composting it in pits. It is reported that tens of thousands of pits were dug in the rural areas of Bombay Province during the above celebrations.

It is necessary that the Gram Sudhar Week should be extended to all the other States, who should also initiate a village cleaning and Manure preparation drive during the Mahatma Gandhi Jayanti from October 2nd—8th 1950.

# Production of Village Compost

The quantity of Compost prepared in pits under the Village Compost Scheme during 1949-50 amounted to 44,24,721 tons, which compares favourably with the production during the previous years as shown in the following table:—

TABLE IV

Progress of the Village Compost Scheme

Year			No. of villages operating the scheme	Quantity of compost prepared in villages	Govt. of India grants for village compost work	Extra food production estimated	
					Tons	Rs. Lakhs	Rs. Lakhs
1944-45 .				1,826	2,10,000	4 89	21.0
1945-46 .				4,247	5,20,000	3 · 39	52.0
1946-47 .				7,569	8,29,000	6.67	82 9
1947-48 .				20,465	12,58,986	4.16	125.9
1948-49 .				36,652	27,65,944	6.80	276 6
1949-50 .	•			101,684	44,24,721	12 99	442.5
	Total			101,684	100,08,651	38 90	1000 9

<sup>\*</sup> Calculated at 2 md, extra grain (worth about Rs. 20) by application of 5 cart-loads (2 tons) of manure per acre.

The progress of village compost work in different provinces and states during 1949-50 is given in Table V from which it will be seen that Uttar Pradesh is leading other states with 22,44,321 tons of rural compost prepared in 25,943 villages, which represent nearly 25 per cent. of the total number of villages in that State. Uttar Pradesh is followed by Bombay with 8,24,610 tons of manure prepared in about 8,200 villages. Punjab, which has passed compulsory legislation, is coming next with 3.6 lakh tons of manure and Orissa has also produced about the same quantity. The other States have got much lea-way to make before they can catch up the records of the above Provinces.

TABLE V

Progress of the Village Compost Schemes in different areas during 1949-50

8. No.	States	No. of villages operating the scheme	Target for 1949-50	Quantity of compost actually prepared	Quantity of compost applied to land	Target for 1950-51
			Tons	Tons	Tons	Tons
1	Ajmer	91	1,00,000	3,556	Nil	° 5,00,000
2	Assam	1,581	5,000	11,457	9,593	50,000
3	Bhopal	1,613	61,600	65,890	22,330	3,20,000
4	Bihar	18,570	3,00,000	1,23.625	1.23.625	12,40.000
5	Bombay	8,200	7,00,000	N,21,610	3,53,825	15,00,000
6	Coorg	272	75,000	1,02,000	20,515	1,50,000
7	Himachal Pradesh .	Nil	1,000	Nil	Nil	8,000
8	Delhi	Nil	Nil	Nil	Nil	Nil :
9	Hyderabad State .	Nil	Nil	Nil	Nil	Nil
10	Madhya Bharat .	487	Nil	40,823	40,523	1,15,000
11	Madhya Pradesh .	2,638	49,000	81,819	6,698	5,57,000
12	Madras	8.230	42,600	56,997	35,066	93,720
13	Mysore State	1,533	60,000	72,489	. 55,414	1,20,000
14	Orissa	12,281	6,50,000	3,12,936	3,47,958	10,00,000
15	P.E.P.S.U	Nil	40,000	Nil	Nil	80,000
16	Punjab (I)	8,367	5,00,000	3,60,602	147,295	30,00,000
17	Rajasthan Union .	Nil	Nil	Nil	Nil	1,00,000
18	Saurashtra Union .	Nil	7,500	Nil	Nil	50 000
19	Travancore-Cochin Union.	4	3,600	1,999	1,999	47,000
20	Uttar Pradesh	25,913	4,00,000	22,44,321	19,45,544	50,00,000
21	Vindhya Pradesh .	Nil	Nıl	Nil	Nıl	5,000
22	West Bengal	11,500	1,00,000	1,17,577	1,03,981	1,00,000
		101,684	66,95,300	44,24,721	32,17,511	137,85,720

In the matter of fulfilling the targets fixed for 1949-50, however, most of the bigger units like Uttar Pradesh, Bihar, Orissa, Punjab and Travancore-Cochin Union have managed to fulfil only 50-60 per cent. of their individual targets. Some States like Madras, Mysore, Madhya Pradesh, Assam and Coorg have no doubt exceeded their target limits, but in these cases the targets fixed for 1949-50 were quite low compared to the number of villages and cattle population present in the above areas. Several states like Rajasthan, Saurashtra, Hyderabad, Vindhya Pradesh, Himachal Pradesh and Pepsu had no Village Compost Scheme during 1949-50, but arrangements have been made for starting the scheme during 1950-51.

In all, out of a total all-India target of 66.95,300 tons fixed for rural compost during 1949-50 only 44,24,721 tons were achieved. This poor execution is due mainly to two factors viz.,—(a) in November Government of India decided that the production of manure under the Village Compost Scheme will not be included for calculating the extra food produced in the country under the G.M.F. campaign; and as such several states treated the scheme as a subsidiary matter not requiring primary attention; and the results obtained were poor and (b) legislation was passed readily by most states for urban refuse composting but they have not done the same for rural composting. Punjab (1)), and Mysore States; the Punjab legislation which requires the deposition of all refuse material in villages in pits instead of in overground heaps is simple and if enforced would increase manure production by atleast 25 per cent. In view of the large potentialities for extra manure production in the rural areas, estimated at 50 million tons which could produce about 2 million tons extra food, it is necessary that special efforts should be concentrated on this scheme during 1950-51. In order to secure maximum results, action should be taken to remove the handicaps mentioned above by (a) including the production of manure in pas under the Village Compost Scheme for calculations of extra food production under the G.M.F. programme (say, by calculating the extra manure production due to "pitting" at 25 per cent. of the total manure prepared in pits and the extra food production at an average of 2-maunds grain by application of 5 cart-loads or 2 tons of manute per acre) and (b) advising all States to pass immediately legislation for tural composting on the lines of the Punjab Manure Conservation Act. (vide Schedule B hereto).

The data given in Table V include also the quantities of compost prepared from sugarcane trash, forest leaves, water-hyacinth, etc. The quantities of manure prepared from the above sources are small as compared to the manure prepared from Cattle Sheds' wastes. As regards composting of human excreta in villages, by opening trench latrines, very little progress has been made except on a small scale in Bombay and Madhya-Pradesh where loans have been given to Village Panchayats for constructing and operating such trench latrines.

# III. Tree Planting Campaign.

The tree planting campaign is closely linked with the "Save More Manure" campaign, since nearly 50 per cent. of the cattle dung produced

in the country is burnt away, due to insufficiency and high cost of wood-fuel. During the year 1949-50, an intensive drive for tree planting was carried out in all States during the monsoon period and in a concentrated manner during the Independence Week Celebrations from August 15th. The amount of work carried out under this head in different areas is summarized in the following Table:

TABLE VI

Statement showing the number of seedlings planted in the States during 1948-49 and 1949-50

Serial		Name	e of St	Number of trees planted during					
		210.11						1948-49	1949-50
1	Ajmer .		•	•	•	•	•		5,991
2	Andamans		•	•			.		2,434
3	Assam .						٠.		71,485
4	Bhopal ,		•					200	5,563
5	Bihar						-	73,327	3,95,055
6	Bilaspur (Sim	ıla) .			,		.		3,100
7	Bombay .		•		•		.  -	16,58,340	16,25,632
8	Coorg							1,563	19,633
9	Delhi	,		•				10,267	27,668
10	Himachal Pr	adesh						76,265	
11	Kutch .								5,859
12	Madhya Prac	desh .					.	1,73,905	10,79,171
13	Manipur .						.	23,225	34,491
14	Orissa						. ]	1 76,630	
15	Punjab .							4,83,883	24,61,19 <b>2</b>
16	Tripura .			•	•				
17	West Bengal							7,58,310	7,83,664
18	Uttar Pradesl	h.	•		•	•		13,27,280	13,52,688
								47,63,195	78,73,626

# IV. Programme for 1950-51.

The programme for 1950-51, viz., the production of 16,80,100 tons from town refuse and 137,85,720 tons from rural waste material requires

the following action to be taken by the States and the Central Government:—

# Town Compost Scheme

- (a) Passing of legislation to make it compulsory on all municipalities, local boards and notified area committees to conserve the manure collected in their areas by adopting the method of Compost-making.
- (b) Grant of loans to municipal bodies for purchase of land and trucks needed for compost production and distribution.
- (c) Maintenance of a fleet of Departmental Motor Trucks for clearing heavy stocks of manure that may get accumulated at the new centres during the first year or two.
- (d) Maintenance of Special Propaganda Staff for carrying out intensive propaganda in the areas within 10 miles distance round-about towns for the purpose of creating a market for the manure produced by the municipalities.
- (e) Provision of Government subsidy for reducing the sale price or transport charges at new centres, till a market is established for the manure on a self-supporting basis.

# Rural Compost Schemes

- (a) Passing of legislation in all States on the Punjab (I) model, to compel villagers to keep their manure in pits instead of throwing them over the ground; the above legislation also to empower Government to requisition immediately land needed for compost-making, by villagers.
- (b) Carrying out intensive propaganda in all villages through the existing staff of the Revenue, Agricultural, Co-operative, Rural Development and Educational Departments and holding demonstrations of the improved method of manure preparation, with special reference to sectional filling of pits and cattle urine conservation.
- (c) Holding competitions in each group of adjoining villages and award of prizes, medals and Certificates for the best individual performances as measured by the average quantity of manure produced in the year per head of cattle; prizes, medals and Certificates should also be awarded to such of the Village officers (Patwaris, Patels or Schoolmasters) who show meritorious work as measured by the number of pits dug up and filled with manure, due to their propaganda.
- (d) Collection of the primary data of manure production in the villages every quarter through the Revenue Staff of Village Patwaris or Patels; and checking the accuracy of the above data by carrying out random sample surveys.
- (e) Organizing Manure Production Drives in the State as a whole by celebrating a Gram Sudhar Week, preferably during the Mahatma Gandhi Jayanti celebrations from October 2nd—8th.

SCHEDULE 'A'
Cost of Production of Town Compost

S. No.	Name of Municipality	Popula- tion	Annual production of com- post			Labour charges per ton of compost			Depot Mainte- nance per ton of compost		
			Tons.	Rs. As.	Ps	Rs.	As.	Ps	Rs.	As,	Ps.
	BOMBAY STATE										
1	Junrar	9,951	144	1 9	0	0	13	4	0	5	7
2	Declali	16,292	5,760	0 12	1	0	11	0	1	0	81
3	Erandol	15,098	696	1 8	8	1	4	9	0	0	9
4	Chalisgaon	22,122	1,262	3 2	81	2	7	6	0	3	2
5	Renebennur	16,994	243	5 14	2	3	7	3	0	4	31
6	Belgaum Centt	14,431	2,880	Nil		1	4	11	0	10	42
7	Barse	34,834	5,792	Nil		0	3	11/2	0	0	48
8	Miraj	32,455	2,920	0 6	61	0	2	41	0	2	83
9	Baroda	1,28,520	1,712	2 9	31	2	12	ž	0	1	11
10	Sirsi	10,451	380	Nil		0	11	9	1	1	21
11	Jalgaon	48,596	1,696	Nil		1	14	7	0	0	112
12	Nadiad	46,510	1,267	Nil		3	7	18	0	5	$\frac{1}{2}$
13	Dharwar	47,992	1,099	4 4	5	3	5	$2\frac{1}{2}$	0	1	51
14	Nasik	52 386	6,000	1 5	1	1	8	111	0	8	U
15	Gadag	56,283	1,977	2 2	5	2	5	41	0	4	10
16	Baramath	13,058	1,752	6 9	81	2	1	51	0	2	ł
17	Hubli	95,577	991	0 7	4	2	15	93	0	1	7
18	Surat	1,71,400	3,636	Nil		4	7	10	0	0	71
19	Broach	55,800	1,500	Nil		1	9	7	0	2	8
20	Poons Cantt	40,400	46,656	Nil		0	2	61	0	0	4
21	Belgaum	58,300	1,093	Nil		0	6	6	0	8	51
22	Nandurbar	22,100	980	Nil		0	8	8	0	0	5
28	Ahmednagar Cautt.	16,200	5,464	Nil		3	3	51	0	0	61
24	Dhulia	53,800	2,237	Nil		0	12	101	0	1	4

1	2	3	4	5	6	7
25	Pandharpur	33,300	T 'ns 4,800	Rs. As. Ps 0 13 1	Rs. As. Ps. 0 11 4	Rs. As. Ps 0 3 2
26	Bhusaval	36,300	1,821	1 8 6	3 3 1	0 8 10
27	Poons City	4,37,500	18,000	1 8 43	1 5 4	0 1 112
28	Abmednagar City .	54,200	5,692	Nıl	1 2 1	1 4 33
29	UTTAR PRADESH Allahabad	2,46,226	2,100	0 10 8	2 3 1	0 1 4
30	Agraj	2,57,368	16,800	1 3 ½	1 6 10	0 1 11
31	Lucknow	3,54,560	1,920	0 8 4	2 3 7	0 2 12
<b>3</b> 2	Lakhimpur	21,235	1,080	1 1 9	2 5 4	0 0 101
33	Hardon	24,252	1,080	0 7 5	1 5 4	0 0 101
34	Ballia	23,520	1,200	1 0 9	2 0 91	0 0 111
35	Mercara	10,052	100	Nil	5 3 2	1 12 0
36	P.E.P.S.U.	14.000				\$7.1
30	MADRAS STATE	14,909	1.460	1 2 71	0 11 10	Nil
37	Tanjore	68,702	6,182	1 4 111	0 5 11	0 0 11
38	Salem	1,29,702	13,127	0 7 9	0 12 101	0 0 3
39	Mathurai	2,39,144	12,000	3 2 81	1 1 2	0 3 4
40	Srivilliputtur	34,642	730	Nil	1 13 5	0 9 9
41	Pollachi	25,198	4,168	5 8 10	0 12 3	0 2 4
42	Vijayawada	86,184	1,260	Nıl	2 1 8	0 2 61
43	Hospet	26,023	2,146	Nil	0 12 51	0 2 3
44	Bellary	56,148	1,460	Nil	0 11 31	1 2 0
45	Tirnbennaralai	33,575	1,000	Nil	1 7 7	0 4 0
46	Chingleput	17,829	3.532	0 10 6	0 7 3	Nil
47	BIHAR Samastipur	13,293	1,470	Nil	1 11 7	0 0 7
48	Chakardharpur .	14,807	1,200	0 13 4	1 1 2	0 7 2
49	Purulia	30,445	440	Nil	0 15 3	0 1 94
50	Deoghar	19,792	720	Nil	2 12 9	0 3 4
51	Madhupur	11,577	520	Nil	2 0 6	0 4 71
52	Chalbassa	13,052	312	0 13 4	2 11 1	0 0 9

1	2	3	4	5		6			7	
53	Ranchi	54,178	Tons 4,732	Rs. As I Nil	s. R		s. Ps	Rs.	As 0	
<b></b>	PUNJAB (I)									
54	Batala	55,000	2,000		5	1 (	-	0	0	9
55	Pathankot	50,000	1,200	3 5 4		0 13		0	8	-
56	Hariana	6,000	1,080	4 2	3	2 (	0	2	5	_
57	Dasuya	6,000	960	6 4	)	2 (	0	1		31
58	Mukerian	8,000	1 <b>,4</b> 60	8 3	3	3 2	7	0		61
59	Miani	3,000	676	1 0	1	7	7	0	11	10
60	Una	8,000	730	Nil		1 3	3	0	1	31
61	Jullundur	1,45,000	14,400	0 8 1		0 9	7	0	1	5}
62	Phillaur	8,000	960	08		0 8	0	0	<b>Į</b> 2	0
63	Hoshiarpur		2,880	0 11 1		0 8	0	0	1	8
64	Abohar .	20,000	2,880	. 0 11 1		0 8	0	0	1	8-
65	Ludhiana	1,52,000	14,400	0 11 4		0 8	7	0	1	5 <u>1</u>
66	Jagraon	30,000	2,400	06		0 8	7	0	2	X0
<b>67</b>	Khanna	20,000	1,440	0 7 9		0 10	8	0	2	ัช
68	Ambala	52,000	5,760	'0 11 1 <sub>1</sub>	i	0 12	0	0	2	0
69	Abdullahpur	10,000	1,680	0 9 10		0 9	2	0	2	10
70	Sonepat	60,000	1,942	0 2		0 15	9	0	2	6
71	Hansi	40,000	2,240	0 0 8		0 10	11	0	0	0
72	Gurgaon	15,000	600	0 9 7		0 12	91	0	0	6
73	Hisser	32,000	6,000	0 2 6		0 5	1	0	7	51
74	Amritsar	5,08,000	2,000	5 2 7		1 2	0	0	3	11
75	Jagadhri	20,000	2,800	0 11 10		0 9	0	0		11
76	Ferozepore	48,000	4,800	0 10 (		0 9	0	0	1	8
77	Gurdaspur	30,000	2,000	4 8 8		1 2	0	0	2	101
78	Tarn Taran	10,000	2,000	5 11 8		1 3	10	0	1	_
	RAJASTHAN	,,,,,	,				-			
79	Alwar	55,000	4,380	4 9 3		1 5	8	0	8	10
80	Udaipur City	60,000	5,400	Nil		1 2	8	0	10	4
	Grand total for 80 centres			105 11 4	12	3 4	5	22	12	8
	Average value per centre			1 5 2		1 8	8	0	4	5

### SCHEDULE B

# THE EAST PUNJAB CONSERVATION OF MANURE ACT, 1949 East Punjab Act No. XV of 1949 as amended by Act VIII of 1950

An Act to provide for the conservation of manure in East Punjab

It is hereby enacted as follows:—

- 1. (1) This Act may be called the East Punjab Short title. Conservation of Manure Act. 1949.
- (2) It extends to the whole of the Province ment. of East Puniab.
- (3) It shall come into force in such areas and on such dates as the Provincial Government may by notification appoint in this behalf.
- 2. In this Act, unless there is anything repug- Interpretanant in the subject or context,-

extent and

commence-

- (a) "Committee" means the Manure Conservation Committee set up or deemed to have been set up under the provisions of section 5;
- (b) "complaint" has the same meaning as in section 4 of the Code of Criminal Procedure, 1898;
- (c) "Conservation of manure" means the collection of manure in a pit or pits of the prescribed dimensions and subjection to the prescribed process for the purpose of enriching the soil by its use thereon;
- (d) "Deputy Commissioner" means Deputy Commissioner of the District;
- (e) "family" means a collective body of persons living in one house under one head or management;
- (f) "Government" means the Provincial Government:
- (g) "head of the family" means a person in charge of a family:
- (h) "manure" means and includes animal droppings, refuse, house-sweepings, ashes, uneaten fodder, residue, filth or rubbish of any kind, but does not include mineral fertilizers:

V of 1898.

- (i) "notified area" means an area notified by Government under Section 3;
- (j) "Panchayat" means a panchayat established under Section 5 of the Punjab Village Panchayat Act, 1939;

XI of 1939

(k) "prescribed" means prescribed by rules made under this Act.

Power notify certain areas.

3. The Government may by notification declare any area situated within the limits of any one Tehsil to be a notified area for the purpose of this Act, and may by notification alter the boundaries of any area so declared.

Liability of occupier or head of a family in a notified area.

- 4. (1) The occupier of any building in a notified area or if more than one person occupy a building in such area, the head of the family residing in such building, shall conserve manure, arrange for its conservation, in the prescribed manner and to the prescribed extent.
- (2) If the occupier, or, as the case may be, the head of the family responsible for conservation of manure, is not in possession of land for such purpose, he shall within one month of the formation of a Committee for the area in which he resides submit a written application to the Committee to provide him in such area with land necessary for the aforesaid purpose.

Formation of Committees.

5. (1) The Panchayat for any notified shall be the Manure Conservation Committee for such area and its powers under this Act shall be in addition to its powers conferred under the Punjab Village Panchayat Act, 1939. XI of 1939.

- (2) If no Panchayat has been constituted for any notified area, the Deputy Commissioner shall establish for such area a Manure Conservation Committee appointing thereto such number of persons, not less than three as he may from time to time fix in this behalf.
- (3) A Committee shall, subject to such rules as may be prescribed, be competent to acquire, hold or transfer property moveable or immoveable, to enter into contracts and to do all other things necessary for the purpose of this Act.

Chairman of Committee.

6. (1) The Chairman of any Committee deemed to be such under sub-section section 5 shall be the Sarpanch of the Panchayat.

- (2) The Chairman of the Committee established under sub-section (2) of section 5 shall be the person appointed as such by the Deputy Commissioner from among the members of the Committee.
- (3) The Chairman shall be the Chief Executive Officer of the Committee and shall responsible for the due maintenance of records or registers which may be prescribed.
- 7. (1) There shall be a fund vested in each Funds. committee which shall be utilized Committee to meet charges in connection with its duties under this Act.

(2) All grants from the Government or local bodies and all sum recovered by or on behalf of the Committee under this Act or otherwise, shall be credited to the aforesaid fund.

8. (1) On receiving any application made to it Committee under sub-section (2) of section 4 the Committee shall take all steps necessary for providing to the applicant the area of land required by him.

to take steps for acquiring

- (2) If the Committee is unable to provide the land required by the applicant, it shall within one month of the application, apply to Government for the acquisition of the necessary area of land within the notified area.
- 9. (1) If the Provincial Government is of the Acquisition opinion that any area is required for conservation of manure, in pursuance of an application made to it by any Committee, it may by notification declare such area to be so required for the purpose of this Act and such notification shall be conclusive evidence of the matters therein, and shall not be liable to be called in question in any court.
- (2) The Deputy Commissioner of the District in which the area referred to in sub-section (1) is situated shall give publicity to the notification issued under sub-section (1) in such manner as he may deem fit.
- (3) After the expiry of 15 days from the issue of a notification under sub-section (1) the Deputy Commissioner may, notwithstanding any law to the contrary, authorize the Committee to take possession of the area specified therein.

of land by Govt.

(4) The Deputy Commissioner shall then proceed to occupy the area or procure its occupation as the case may be and the provisions of the Land Acquisition Act 1894, except sections 4 to 8 inclusive as amended by the Land Acquisition (East Punjab Amendment) Act, 1948, shall be applicable as nearly as may be.

Power of Committee to charge rents. 10. The Committee may charge rents not exceeding the prescribed scale for the site or sites it provides for conservation of manure to any person who has made application to it under sub-section (2) of section 4.

Power of entry.

11. Any member of a Committee or any Revenue Officer not below the rank of Naib-Tehsildar shall be empowered to enter upon any land or premises within the jurisdiction of such member or officer, as the case may be, for the purpose of ascertaining whether or not manure is being conserved in such land or premises.

Power to require some conservation of manure.

- 12. (1) If any person fails to conserve manure in the manner or to the extent required under sub-section (1) of section 4, the Committee may by notice in writing specifying a reasonable period require him to conserve manure in the prescribed manner or to the prescribed extent.
- (2) If any work required to be done under sub-section (1) is not executed within the period of the notice, the Committee may itself cause such work to be executed and recover a sum not exceeding the cost thereof from the person to whom notice was issued under sub-section (1).

Penalty for disobedience

13. Any person who disobeys a notice issued by the Committee under Section 12 shall on conviction by the Committee be punished with fine which may extend to twenty-five rupees, and if the breach is a continuing breach, with a further fine which may extend to four rupees for every day after the first during which the breach continues.

Supervision of the proceedings of the Commi14. (1) The Deputy Commissioner may of his own motion or on an application of the party aggrieved, call for the records of any proceedings

whereby any person has been convicted by the Committee under section 13, and may cancel or modify any order of conviction but not so as to enhance the penalty.

ttee by the Deputy Commissioner

- (2) A fee of Rs. 2 shall be paid on every application.
- 15. Subject to an order made by the Deputy Commissioner under section 14, the order of a Committee under section 13 shall be final and shall not be liable to be called in question by any court or other authority.

Finality of orders of the Committee.

16. If in any case a Committee fails within a Procedure if reasonable period of the default to issue notice the Commitunder sub-section (1) of section 12, a Revenue issue notice. Officer not below the rank of Naib-Tehsildar may issue such notice. If the notice is not complied with he shall have the power of a Committee under sub-section (2) of that section.

the Commit-

17. If any person disobeys a notice issued Proceedings under the last preceding section the officer who on disobediissued the notice may make a complaint to the notice issued nearest Magistrate having jurisdiction who shall under the thereupon exercise all the powers of a Committee ing section. under section 13.

last preced-

XVIII of 1879

18. Notwithstanding anything contained in the No legal Legal Practitioners Act, 1879 no legal practi- practitioner tioner shall be permitted to appear before the to appear before Com-Committee for any party in any proceedings mittee. under this Act.

19. The Deputy Commissioner may by written Delegation. order delegate any functions under this Act by name or by designation of office to any Revenue Assistant or Tehsildar.

20. Any sums due under this Act may on Recovery of application to the Collector be recovered as if dues as arrapplication to the Collector be recovered as if dues as arrapplication to the Collector be recovered as if they were arrears of land revenue.

revenue.

21. No suit, prosecution or other legal proceed- Bar to suits ings shall lie in respect of anything in good faith done or intended to be done under this Act or the rules made thereunder.

or legal proceedings

22. The provisions of the Punjab Village Panchayat Act, 1939, specified in the Schedule to XI of 1939. this Act shall, so far as may be, apply to the proceedings of Committees, the powers to be exercised by them and the duties to be performed by them under this Act and their suspension or abolition.

Power of Government

- 23. (1) Government may make rules for carryto make rules ing into effect the purposes of this Act.
  - (2) In particular and without prejudice to the generality of the foregoing powers, Government may make rules regulating:—
    - (a) the size of pits for the conservation of manure, the processes to which it is to be subjected and the extent to which it is to be conserved:
    - (b) the appointment, suspension and removal of members of Committees:
    - (c) the functions and powers and appointment, suspension and removal of Chairmen of Committees:
    - (d) the powers of a Committee to sue and to acquire, hold or transfer property and to enter into contracts:
    - (e) the records and registers to be maintained by Committees and their custody and proper maintenance;
    - (f) the custody and proper maintenance of the funds of Committees;
    - (g) the terms and conditions on which lands may be transferred by Government to Committees:
    - (h) the scale of rents to be charged by Committees for sites provided by them for conservation of manure:
    - (i) the conduct of business at meetings of Committees and the quorum for such meetings:

- (j) the punishment, suspension and dismissal of servants of Committees:
- (k) the manner in which summons issued by Committees are to be signed sealed; and
- (1) any other matter in respect of which rules are expressly required or allowed by this Act to be made.
- 24. The East Punjab Conservation of Manure Repeal of Ordinance, 1949, is hereby repealed but notwith-Ordinance standing such repeal any orders made, any No. XV of thing done, any action taken or any proceedings 1949. commenced or liability or penalty incurred in exercise of the powers conferred by or the said Ordinance shall be deemed to have been made, done, taken or commenced or incurred in exercise of the powers conferred by or under this Act.

#### SCHEDULE

Sections 11, 12(2), 17, 18, 33, 34, 36(3), 38, 50, 61, 64,

### APPENDIX B

### COMPOSTING OF VILLAGE NIGHT SOIL

# Wardha System of Compost Latrines for Villages

1. Recommendations of the Sub-Committee Appointed by the Madhya Pradesh Government in July, 1948.

The Committee recommended three types of structures for composting village nightsoil in situ.

The general features of these sanitary structures are common. Each runit of the structure has two trenches constructed side by side which are used in relay. In structures I and II, a brick wall 6' in height is constructed in between these two trenches. End walls along the breadth of the trenches are also provided. The superstructure consisting of the latrine seats, partitions, doors and roofs etc., is of ordinary cheap materials in structure II and of costly material such as cement-asbestos sheds in structure I. These materials are removed from one trench and fitted on to the other, when the second trench is put in use after the first is fully utilised. In structure III, there are no walls raised in between the trenches or at ends, but a light closet type superstructure with six compartments for six seats is constructed of ordinary materials and is put on the first trench and lifted and put on the second trench when the first trench is fully utilised.

### SPECIFICATIONS AND CONSTRUCTION OF THE SANITARY STRUCTURES

Structure I.—First class structure with costly materials cement-asbestos roofing and partition, etc. The structure is constructed as given below:—

- (1) Dig a trench of length 21'-6", breadth 10'-1½", and depth below ground 3' (the breadth of the trench could be reduced to 6'-3", if the breadth of each trench is to be only 2' after brick lining).
- (2) Cover the whole bottom of the trench with  $4\frac{1}{2}$ " brick in lime mortar. Over this construct 9" brick wall in lime mortar all round with an off-set of 3" on all sides. Also construct  $13\frac{1}{2}$ " wall in the centre, continuing this above the platform level up to roof level; and two 9" cross walls at 6'-9" centre to centre. The central wall will thus form two compartments. After the full use of one compartment the superstructure and platform is removed to the other one.
- (3) Two 4½" diameter teak ballies each 20'-3" in total length (can be divided into three pieces of 6'-9" in length) are placed along the length of the pit at 2'-4½" centres, for supporting the wooden platform and squatting seat. The platform is made from side cuts of teak logs. The joint of the planks should be air tight. An opening 9" x 24" should be provided for each latrine seat; over the opening

- is fixed a flytight cover  $24'' \times 30''$  with a handle to lift it. This cover rests over 1'' wooden corbing. The cover is hinged at the back to a plank  $1\frac{1}{2}''$  thick.
- (4) 4½" diameter balli posts are fixed in 9" x 9" base plates at corners of the walls to support the roof and the bamboo matting. Also posts are fixed in 6" x 6" base plate 2' from corner posts for fixing doors. Half cut ballies are fixed in between the posts for fixing the bamboo mat walling. The bamboo mat walls are kept in position by split bamboo pieces. The roof is made of asbestos sheets, cement asbestos sheets, plane or corrugated, may also be used, instead of bamboo mat for walls.
- (5) Murrum is spread and properly dressed for a width of 4' all round.

Estimated cost Rs. 1,000 for one unit described above providing 6 seats for 60 persons. The estimates of quantity of material required are given at the end.

Structure II.—It is similar in description to structure I given above, except that the material for roofing and partition walls will be cheaper, consisting of bamboo matting, thatched roof etc. The cost of the structure is estimated at Rs. 700 for one unit of 6 seats for 60 persons.

Structure III.—This will consist of two separate parts—

- (a) the trenches, and
- (b) the superstructure.
- (a) The trenches.—For every unit structure there will be 2 trenches of the same dimensions used in relay. When one is in use, the other will be empty or completely filled with composted material which will be excavated when ripe. The internal dimensions of these trenches (after brick lining) for 6 seats will be 20' x 2' x 4' to 4½'. The trench will be 3' underground and 1' to 1½' over ground. The trenches are constructed as given below:—
  - (1) Dig a trench of height 21'-6", breadth 3'-6" and depth 3'.
  - (2) Cover the whole bottom of the trench with  $4\frac{1}{2}$ " brick on edge with lime and mortar. Over this construct 9" brick wall in lime mortar all round with an off-set of 3" on all sides. The wall should be built 1' to  $1\frac{1}{2}$ ' overground (3' underground and rest overground). Also construct 9" cross wall at 6'-9" centre to centre. Another trench of the same type may be constructed a few feet apart from the first. These trenches could also be constructed together, a central wall of  $13\frac{1}{2}$ " serving as a common wall. Murrum is spread and properly dressed to a width of 4' all round with a slope of 1 in 2.
- (b) Superstructure.—The superstructure will consist of a fly-proof platform at the top and shiftable enclosure with partition walls, doors and roof constructed in two units 10' in length.

Two  $4\frac{1}{2}$ " diameter teak ballies each 20'-3" in total length (can be divided into two pieces of 10-' $\frac{1}{2}$ " in length) are placed along the length of the pit at 2'- $4\frac{1}{2}$ " centres for supporting the wooden platform and squatting seat. The platform is made from the side cuts of teak logs. The joints of the teak planks should be air-tight. An opening of 9" x 24" should be provided for each latrine seat. Over the opening is fixed a fly-tight cover of 24" x 30" with a handle to lift it. This cover rests over 1" wooden corbing and is hinged at the back to a plank  $1\frac{1}{2}$ " thick. This platform may be constructed in two parts so that it could be easily lifted and fixed over the other trench.

The superstructure would be a light closet type of structure constructed on four wooden ballies with small wooden supports for resting it on the ground. Wooden battons, bamboos and bamboo mats are used for its construction. Each seat is closed on all sides, front side being used as the door. A suitable lean to roof is provided.

The cost of this structure, inclusive of trenches is estimated at Rs. 500 per unit of 6 seats for 60 persons.

# Method of using the latrines.

Before putting the above compost latrines in use, a three-inch layer of organic refuse (grass, shredded leaves, etc.) or dry earth mixed with available refuse, is spread at the bottom of the trench. A stock of refuse or dry earth is kept near each privy and every person using the privy has to cover the faeces with at least half a pound (3 to 4 handfuls of refuse or dry earth). Before using the latrines, the seat cover is lifted and after using the trench, the faeces is covered with refuse and the seat cover closed.

The Gram Panchayat that will introduce these structures in the village will employ a compost supervisor to take care of these structures. A compost supervisor could easily supervise about 10 to 15 units of six seats each *i.e.*, one supervisor could easily manage a village population of six hundred to nine hundred. This person can be of any caste as he has not to handle the night-soil. He may be paid reasonable emoluments in kind and money. This supervisor will have the following duties:—

- (i) Every day from 9 a.m. to 12 noon, he will put an extra 2 inch to 3 inch layer of refuse in each trench and ram the refuse lightly with a wooden rammer.
- (ii) In the afternoon from 2 p.m. to 6 p.m. he will collect as much organic refuse as possible from the village abadi and nearby fields as per directions of the President of the Gram Panchayat. Voluntary services of a bullock cart may be obtained from the cultivators of the village for transporting refuse to the various units of sanitary structures.
- (iii) The supervisor with the help of other labourers or voluntary social workers will remove the ripe manure from the trenches and heap it outside the trenches for sale.

It is felt that the Compost supervisor could be easily paid from the receipts of the sale of manure. A population of 500 will need about 10 units of six sheets each and the annual production of manure will be about 5,000 cu. ft. per 200 cart loads. If the manure is sold at Rs. 2 per cart load, which is a very moderate price, the compost supervisor could be easily paid Rs. 20 to Rs. 25 per mensem. To start with, voluntary contributions of grain may be collected from the well-to-do cultivators and others and the compost supervisors may be given his emoluments from this collection in kind.

### Availability of refuse.

- 1. Small dustbins may be kept in village abadies for collecting all ash, house sweepings, and road sweepings. Refuse from these would be removed in wheel barrows by the Compost Supervisor.
- 2. If there is a primary school in the village, it should be made compulsory on the teachers of the school to take the students out once in a week for an hour for collecting refuse from the field and stacking it near the privies. This may be considered as a practical lesson in village sanitation and as a part of the weekly time-table. It should have the same place in the school work as the prayer or National Anthem has.
- 3. A weekly day for collection of refuse may be organised by the Gram Panchayat, when all the villagers, old and young could help in collecting the refuse.
- 4. Voluntary contributions of refuse from the cultivators may be asked for and in return they may be given some quantity of ripe manure. (for 5 cartloads of dry refuse—One cartload of manure).

### Provision of funds, land etc.

Since the successful operation of the compost latrines requires the active cooperation of the villagers, it is recommended that to start with, be system may be introduced in those villages which possess active Gram Panchayats, Congress Committees or other Social workers who can undertake proper supervision of the latrines.

It is recommended that two units of latrines, one for men and the other for women, may be first constructed. For this purpose, interest free loans @ 500—600 per unit may be granted to the Gram Panchayat or other local body concerned, repayable within a period of 10 to 15 years. Where the villagers are willing to make voluntary contributions of materials, labour and money, it would be possible to reduce the above capital cost considerably.

Before loans are granted, Gram Panchayats or other local organisations to whom the loan is granted should agree to obtain the active co-operation of the people in using the latrines according to instructions, to exercise proper supervision and to empty the manure when ready so that the old trenches can be used again.

In those cases where suitable sites are not available near the out-skirts of the village abadi for construction of the latrines, Government should come forward to requisition necessary land for the above purpose. These sites should be at least 20 yards away from the nearest habitations. It would minimise possible nuisance if a live fence (up to a height of 4 to 5 ft.) of rapidly growing hedge plants could be established all round each unit of trench latrines. Each unit would require an area of about 30 ft. x 15 ft., and would be sufficient for 50 to 60 persons of the village population. If the scheme proves successful, the number of units could be increased in subsequent years.

# Conversion of Night Soil into Manure in Villages

By

Shri R. B. Gode, M.Sc., Compost Development Officer, Bombay State.

An examination of a number of plans worked out for the construction of trench latrines in the villages showed that the cost of construction would vary very greatly from village to village, depending on the type of construction adopted, the availability of materials and the provision of free labour by the villagers. The cost is seen to vary from Rs. 2 per person to Rs. 20 per person. It is considered that, provided labour is given free by the villagers and as much locally available material as possible is used for construction, the cost should not exceed Rs. 5 per head. Financially it would not be possible for Government to give as subsidy perhaps more than Rs. 2 per head of population. A loan could, however, be given for the balance of the expenditure at a fairly easy rate of interest. A loan could also be given for meeting the recurring cost for the first one or two years, i.e., till the income from the sale of night soil manure has not begun to come in regularly. The recurring expenditure would amount to about Rs. 200 per year for trench latrines sufficient for a population of about 1,000 persons. The production of night soil manure from latrines used by 1,000 persons would amount to about 250 cart loads per year, bringing in an income of at least Rs. 500 at the rate of Rs. 2 per cart load. The price of night soil manure varies from village to village according to the type of cultivation and existence or otherwise of irrigation facilities. In some areas the price of night soil manure may be as high as Rs. 6 to Rs. 8 per cart load. The surplus income (i.e. after meeting the recurring expenditure) could be utilised for repayment of the loan and meeting the interest charges. Depending on the cost of construction, the loan could be repaid within a period of 10 to 30 years. Loans can be given by Government only to corporate bodies, such as the village panchayats, cooperative societies, or other registered organisations. Therefore, where loans become necessary, only such villages, as have such corporate bodies willing to undertake the responsibility of payment of the loan, should be selected for introducing the scheme. In order that the income should be as high as possible, villages having irrigation facilities should be preferred. At the same time in order to

the construction of latrines is locally available at cheap rates should be selected. In any case it is essential that there should be at least one or more social workers, who are willing to devote considerable time and energy to the execution of the scheme.

Seven different plans for the construction of village latrines are attached. Whichever plan is selected according to the local circumstances, it would be useful to remember the following general principles:—

- (1) Night soil takes about 6 to 8 months for decomposition into innocuous manure.
- (2) Excess of moisture, either on account of the flowing of rain water into the trenches or by the addition of wash water to the night soil retards its decomposition. The rain water which may fall directly into the trenches would not retard decomposition except in the very heavy rainfall areas. In all cases, precautions would have to be taken to prevent rain water collecting in the area and flowing into the trenches.
- (3) For comfortable sitting, the opening in the seat should be about 8—10 inches wide.
- (4) All wood and bamboo work as well as bamboo chattai or tatya should be treated with tar before use.
- (5) Whichever type of construction is adopted, it is essential for the users to develop the necessary civic sense for using the latrines carefully. They should also be taught to invariably cover the excreta with earth, as if it was a ritual. The services of a part-time sweeper, where available, for occasional cleaning of the latrines and their precients would be useful.
- (6) The space required per seat should be about  $2\frac{1}{2}$ ' x  $2\frac{1}{2}$ ' to 3' x 3'; the latter size would give comfort to the users. The number of seats required should be calculated on the basis of 1 seat for 10 to 15 persons. Where the population is large, one seat may suffice even for 20 persons.
- (7) Construction of latrines should be done in stages. It would not be advisable to construct all the latrines required for the entire population of the village to start with, on the assumption that all of them would start using the latrines immediately they are constructed. Perhaps, one set should be constructed for men and one for women to begin with. Additional sets should be constructed as and when necessity is felt.
- (8) The latrines should not be constructed only at one place. They should be situated in different directions around the village to afford the maximum convenience to the users.
- (9) In all cases separate latrines should be provided for men and women and should be sufficiently apart from one another.

- (10) The habits of the villagers in this respect should be studied. In some villages women do not need privacy from one another—in fact they might dislike such privacy. In such cases, while the latrines should afford privacy from outsiders, no partitions may be constructed to give privacy to the users from one another.
- (11) The roof over the latrines would be required only in the rainy season. It would be preferable to keep the latrines open to the sky in the other seasons so as to hasten decomposition and to reduce the smell nuisance.
- (12) The trenches should, in no case, be accessible to cattle or pigs. If the construction of the latrines is katcha, *i.e.*, of comparatively weak material, a fence or a loose stone wall should be provided all round the latrines to prevent cattle and pigs having access to the latrines.
- (13) The approximate current rates for construction are as follows:—
  - Cost of excavation—Rs. 1-8 to Rs. 3 per 100 c. ft. Masonry work, brick in line or undressed stone in lime—Rs. 60 per 100 c. ft.
  - Masonry work in mud would be about Rs. 45 per 100 c. ft.
  - Roofing with country tiles would cost about Rs. 50 per 100 sq. ft.
  - Bamboo matting, with tar applied, would cost about 3 ans. per sq. ft.
  - C.I. sheets would cost about 6 ans. per sq. ft.
  - Round teak ballies, 3 to 4 inches in diameter would cost about 5 to 8 annas per running foot.
  - A carpenter's wages would be Rs. 3 to 4 a day, labourer's wages would be Rs. 1 to 1-8 a day and a mason's wages would be about Rs. 3 a day.
- (14) The volume of trench required per head per year would be about 6 c. ft.
- (15) One cart load of night soil is equal to about 24 c. ft. i.e., equivalent to the night soil produced by 4 persons in a year.
- (16) Village refuse, especially road sweepings and dry leaves would give a good material for covering the excreta, but should be used in addition to dry earth.
- (17) After decomposition night soil gets reduced in volume to about 66 per cent of the original.
- (18) The rate of manuring by night soil manure should be about 10 cart loads per acre of irrigated land and about 5 cart loads per acre of unirrigated land. The additional yield of food grains from one acre of irrigated land would vary from 3 to 5 Bengal maunds and about half of that in the case of unirrigated land. The value of additional food grains produced may be computed at Rs. 12 per Bengal maund.

### Plan I

The trench size is 30' x 1½' x 1½' Shahabad stone slabs 1" thick and 2' x 9" are used at the rate of two slabs per seat. The distance between the two slabs is 10". Bamboo matting partitions 6' x 2½' are used between seats. Bamboo matting screens are also provided at the back and on the top. After leaving a passage, a screen is also provided in the front. Common doors are provided. Bamboo matting is fixed by unsplit bamboos with split bamboo battons at suitable intervals. The stone slabs along with the partitions and the frame work of the shed is moved laterally along the trench as the trench gets filled up. Half of the 30' long trench is used at a time. When one trench is full, all the fittings and seats are transferred to another trench. Trenches sufficiently long for a population of 1,000 persons, with superstructures, would cost about Rs. 2.000.

#### Plan II

The trench size is  $50' \times 1\frac{3}{4}' \times 3'$ . 18 feet of the trench is covered by a shed to be used in the rainy season. The open length of the trench of 32' is enclosed by a wall 4' high and  $2\frac{1}{4}'$  broad. Turnstiles are provided in the wall so as to admit men and to keep out animals. The trenches are to be lined with masonry work with bricks. Such structures enough for 1,000 persons are estimated to cost Rs. 15,000.

### Plan III

The trench size is 24' x 2½' x 3'. The trenches are dug in sets of 3 each. The trenches are lined with masonry work and a roof and partitions of bamboo matting are provided. The cost is estimated at Rs. 6,000 for a population of 1,000 persons.

### Plan IV

The trench size is 25' x 2' x 3'. A hedge 30' in length of grass or bamboo matting in the beginning to be substituted by a live hedge in due course, is placed in front of the trench as a screen parallel to the length of the trench. The trench is divided into four equal sections with the help of five vertical partitions of bamboo or grass matting of the size 5' x 4½'. Two wooden cross planks 4' long and 10" broad are placed across each section at a distance of 12 inches from one another, to form seats. When one section of the trench is full, the planks forming the seats are removed to the adjoining section of the trench.

#### Plan V

This is meant for the use of women and children. A suitable area of 15'—20' broad and 20'—25' long is enclosed all round with live hedge of grass or bamboo matting. Bricks or stones are provided to form seats arranged in rows without any partition in between. The excreta is removed twice a day by a sweeper, who transfers the same to a close-by compost trench of suitable size in which the material is composted in alternate layers with dry refuse collected from the roads and surroundings of the village,

Compost production from urban refuse in India—Statistics of production and distribution during the quarter 1st April, 1950 to 30th June 1950.

Sedial No.	Mange of State	No. of composi contres	Vol. of compost prepared during the quarter	Vol. of conspost sold during the quarter	Vol. of compost sold from 1-4-50 up to date	Vol. of unsold compost (old & new) in stock at the end of the querter
1,	Ajmer	4	Cu. ft. 94,050	Cu. ft. 71,200	Cu. ft. 71,260	Cu. ft. 7,04,099
2	Assam				٠.	· • •
` 3	Bengal (West)	''				•••.
4	Bhopal				.,	•••
5 ;	Bihar	<b>3</b> 0 .	3,05,825	2,70,501	2,70;501	16,89,076
6	Bombsy		••	•• .	••	
7	Coorg	1	432	518	518	2,000
8	Delhi	••	••	••	••	
9	Himachal Pradesh	••	••	••	••	
10	Hyderabad State .	25	] 1,83,926	2,02,172	2,02,172	3,58,867
11	Madhya Bharat .	+sludge 52	5,82,210	6,900 3,77,700	6,900 3,77,700	17,64,625
12	Madhya Pradesh .	••	••		••	
13	Madras	134	20,54,887	22,82,130	29,29,886	49,46,802
14	Mysore State	81	3,37,559	1,22,773	1,22,773	11,06,786
15	Orissa	16	1,33,660	41,020	41,020	5,44,038
16	P. E. P. S. U	••	••	••	••	••
17	Punjab (I)	55	10,95,700	3,01,130	3,01,180	26,53,070
18	Rajasthan Union .	••	••		••	••
19	Saurashtra Union .	••	••	••	••	••
20	Travancore-Cochin	••	••	••	••	••
21	State. Uttar Pradesh .	230	41,05,546	23,67,732	23,67,732	11,80,585
22	Vindhya Pradesh .	6	14,480	3,050	8,050	11,430

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